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# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY

### WITH INDEX

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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# AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY  
WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during December, 1967



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WASHINGTON, D.C.

**JANUARY 1968**

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## INTRODUCTION

*Aerospace Medicine and Biology* is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics (AIAA), and NASA. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

- a. NASA entries identified by their *STAR* accession numbers (N67-10000 series),
- b. AIAA entries identified by their *IAA* accession numbers (A67-10000 series); and
- c. LC entries identified by a number in the A67-80000 series.

Many of the abstracts included in this publication have been reproduced from those appearing in *STAR* and *IAA*. This procedure, adopted in the interests of economy and speed, has introduced some variation in size, style, and intensity of type.

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*(continued)*

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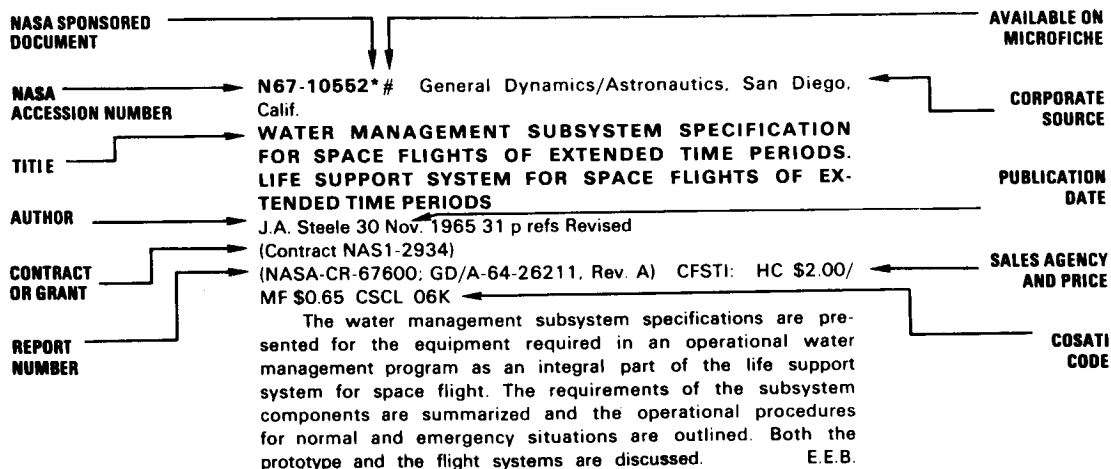
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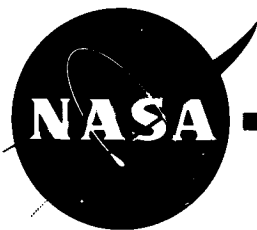
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## TYPICAL CITATION AND ABSTRACT





# AEROSPACE MEDICINE AND BIOLOGY

*a continuing bibliography* JANUARY 1968

## STAR ENTRIES

**N67-38071#** Army Natick Labs., Mass. Technical Library.  
**MOISTURE EQUILIBRIUM IN RELATION TO THE  
CHEMICAL STABILITY OF DEHYDRATED FOODS: A  
BIBLIOGRAPHY**

Eugene G. Beary, comp. Jan. 1967 146 p refs /ts Bibliographic  
Ser. 67-1

(AD-656927)

A bibliography is presented with abstracts of 380 references  
on moisture equilibrium in relation to the chemical stability of  
dehydrated foods. Author and detailed subject indexes are provided.

Author (TAB)

**N67-38100#** California Univ., Los Angeles. Dept. of Engineering.  
**PERFORMANCE STUDIES ON THE NOTS-UCLA TRACKING  
SIMULATOR: AN INVESTIGATION OF OPERATOR  
PREDICTIVE BEHAVIOR ON TWO-DIMENSIONAL  
COMPENSATORY TRACKING**

Russell L. Smith and John Lyman Jun. 1967 30 p refs

(Contract N123(60530)32857A)

(Rept.-67-32; TR-40; AD-657182)

The experiment assessed the extent to which operators  
employed predictive behavior on two-dimensional tracking. Two  
problems were presented: in one, operators were asked to extrapolate  
an overlearned trajectory upon the disappearance of the target  
and in the other, operators tracked one of four possible trajectories  
with and without pre-test knowledge concerning the specific  
trajectory that would be presented. No evidence was found which  
suggested that operators exhibited predictive behavior on the bases  
of trajectory experience, immediate past history of the target, or  
expectancies derived from the pre-test trajectory information. The  
results also indicated that tracking error is largely a function of  
trajectory pattern, rather than the actual target dynamics (velocity,  
acceleration), and that error magnification facilitated performance  
on all patterns.

Author (TAB)

**N67-38102#** School of Aerospace Medicine, Brooks AFB, Tex.

**BODY VOLUME OF ADULT MEN**

Chester L. Ward Jun. 1967 5 p refs

(SAM-TR-67-42; AD-657316)

Body composition determinations were made on 404 adult  
men by use of a volumetric method. The testing of a proposed

nomogram for estimation of body volume from height and weight  
revealed the chart to be biased for adult men. Body volume was  
found to correlate well with body weight (correlation coefficient of  
.996). Body volume of men in liters, V, may be estimated from  
body weight in kilograms, W, by using the formula:  
 $V = -4.7573 + 1.0153 W$ . The ideal weight given on the USAF  
standard weight table was found to have a correlation coefficient  
of only .672 with calculated percent body fat. Author (TAB)

**N67-38107#** California Univ., Los Angeles. Dept. of Engineering.  
**PERFORMANCE STUDIES ON THE NOTS-UCLA TRACKING  
SIMULATOR Final Report, Apr. 1963-Jun. 1967**

Russell L. Smith and John Lyman Jun. 1967 35 p refs

(Contract N123(60530)32857A)

(Rept.-67-33; TR-41; AD-657184)

The report summarizes the principal findings from a series of  
human tracking experiments conducted on the high inertia NOTS-  
UCLA tracking simulator. Emphasis in the series was on displays,  
controls, multiple sensory cues, trajectory characteristics, and  
predictive behavior of the human operator. Results from various  
studies relevant to particular parameters are integrated to provide  
continuity. Theoretical and practical implication of the data are  
discussed in relation to design of range tracking systems. Limita-  
tions of findings are also discussed and reference is made to  
areas which appear in greatest need of continued research.

Author (TAB)

**N67-38124\*** Scientific Translation Service, La Canada, Calif.  
**HEMATOLOGICAL CHANGES IN HEALTHY PEOPLE  
DURING MUSCLE WORK (THE MYOGENIC LEUCOCYTOSIS)  
[DIE VERAENDERUNG DES BLUTBILDES WAEREND DER  
MUSKELARBEIT BEI GESUNDEN (DIE MYOGENE  
LEUKOCYTOSE)]**

A. Egoroff Washington, NASA, Oct. 1967 21 p refs Transl.  
into ENGLISH from Z. Klin. Med. (Heidelberg), y. 100, 1924  
p 485-497

(Contract NASw-1496)

(NASA-TT-F-11294) CSCL 06S

Tests were made to determine the character of myogenic  
leucocytosis in relation to muscle work. A blood picture is  
sometimes observed after strenuous muscle work which is a sign  
of "myogenic intoxication" of the myeloid tissues. Author

**N67-38143#** School of Aerospace Medicine, Brooks AFB, Tex.  
**ALLERGY AND SINUS DISEASE IN AVIATORS**

Frederick G. Collins and Morgan E. Wing May 1967 5 p refs

(SAM-TR-67-47; AD-657312)

The paper covers all aeromedical consultation cases seen  
at the USAF School of Aerospace Medicine during the period  
December 1960 to July 1965. This study is concerned primarily  
with the occurrence of nasal allergy and chronic sinus disease in

aviators. Evaluation of the history as given by the patient, diagnosis of the disease (allergy or sinusitis) present, and a comparison between incidence of cases in both disease areas are presented. Age and flying time in both jet and reciprocal aircraft were not found to be significantly related to the incidence of chronic sinusitis.

Author (TAB)

**N67-38177#** California State Polytechnic Coll., San Luis Obispo.  
**DEUTERIUM ISOTOPE STUDIES ON 2,3-DICARBAHEXA-BORANE (8)**

John R. Spielman, Richard Warren, Gary B. Dunks, James E. Scott, Jr., and Thomas Onak 1 Aug. 1967 11 p refs Submitted for publication

(Contract Nonr-3364(00))

(TR-14; AD-657174)

Deuterium exchange at various positions on the C2B4H8 molecule was studied. D2 exchanges with all boron-bonded hydrogen atoms, and B2D6 in the presence of diglyme exchanges only at the 4-, 6-terminal positions. The (CH3)2C2B4H6-DCI exchange, catalyzed by aluminum chloride, occurs at both apex and base terminal positions. C,C-Dideuterio-2,3-dicarbahexaborane(8), D2C2B4H6, was prepared for comparison of the infrared spectrum.

Author (TAB)

**N67-38180#** Washington Univ., Seattle.  
**THE CONSTANT ERROR IN AMPLITUDE DISCRIMINATION AND THE INTER-STIMULUS INTERVAL: A REEXAMINATION**

Don A. Ronken [1966] 94 p refs

(Contract Nonr-477(34))

(PRP-35N; AD-657263)

The constant error or time error observed in psychophysical discrimination experiments has been a source for conjectures about the judgment process, the suggestion being that the nature of the errors indicates something significant about the underlying decision mechanism. The classical experiment for this purpose shows how the constant error or response bias changes as the inter-stimulus interval varies. This relationship is examined for the case of amplitude discrimination by using an XAB paradigm which switches between several amplitude levels randomly from trial to trial. Data from three very experienced observers indicate that with this procedure, variations in the inter-stimulus interval do not affect the response bias, but the discriminability decreases regularly with increasing intervals. A signal detection-type model is developed for the experiment which is used to describe two alternative interpretations for the effect of the inter-stimulus interval. The first interpretation follows the classical fading trace notion, while the second postulates a random walk for the psychological representation of stimulus X. It is shown that neither hypothesis alone is sufficient to account for the discriminability changes that occur with the inter-stimulus interval; effects characteristic to each interpretation appear in the data.

Author (TAB)

**N67-38184\*#** National Aeronautics and Space Administration, Washington, D. C.

**AEROSPACE MEDICINE AND BIOLOGY. A CONTINUING BIBLIOGRAPHY WITH INDEXES**

Sep. 1967 168 p refs

(NASA-SP-7011(41)) CFSTI: HC\$3.00/MF\$0.65 CSCL 06S

Abstracted material dealing with the biological, physiological, psychological, and environmental effects on man during simulated or actual flight is presented in a continuing bibliography with indexes. Related topics such as: sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors are considered. Assembled are groups of references formerly announced in separate journals for use by medical and biological scientists. Entries are obtained from NASA, American Institute of Aeronautics and Astronautics, and the Library of Congress.

S.P.

**N67-38192#** Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

**ATTENUATION CHARACTERISTICS OF EARMUFFS AT LOW AUDIO AND INFRASONIC FREQUENCIES Final Report, Jan. 1966-May 1966**

Charles W. Nixon, Harold K. Kille, and L. Keith Kettler (Dayton Univ.) May 1967 24 p refs

(AMRL-TR-67-27; AD-655939)

Sound attenuation and transmission loss characteristics of three different earmuffs models were determined from (1) physical measurements of discrete frequency signals in the range from 1 to 500 Hz inside and outside earmuffs being worn by subjects and (2) psychoacoustical or subjective measurements employing the United States of America Institute of Standards Real Ear Attenuation at Threshold Method. Evaluation of the data showed good correlation between the two measurement methods. Greater attenuation was obtained with the subjective method. It was interpreted to be due primarily to the masking effects at threshold of hearing of physiological noise present under the earcups. Findings show that typical present-day earmuffs provide approximately 10 dB of attenuation in the frequency range from 20 to 100 Hz and very little sound protection below 20 Hz. It is recommended that insert earplugs be used for sound protection in intense low audio frequency and infrasonic sound fields. Good earmuffs in combination with insert earplugs should provide more protection than earplugs alone.

Author (TAB)

**N67-38244#** George Washington Univ., Washington, D. C. Human Resources Research Office.

**SOME EFFECTS OF DIFFERENTIAL PRETASK INSTRUCTIONS ON AUDITORY VIGILANCE PERFORMANCE**

G. L. Neal Jul. 1967 10 p refs Presented at the Southwestern Psychological Assoc. Meeting, Houston, Tex., Apr. 1967 Its Profess. Paper No. 34-67

(Contract DA-44-188-ARO-2)

(AD-656942)

In this study of the evaluation of pretask instruction effects on vigilance performance, the researchers made an assessment of demand characteristics. Subjects were 203 students from University of Oklahoma classes who were given four possible reasons for the experiment; the treatments were called Required Chore, Important Task, Subject Important, and Combined Treatments. It was demonstrated that subject motivation level via pretask instructions can influence the course of the monitors performance, at least in the short run.

Author (TAB)

**N67-38251#** Naval Medical School, Bethesda, Md.  
**MECHANORECEPTORS [MEKHANORETSEPTORY]**

O. B. Il'inskii Jun. 1967 100 p Transl. into ENGLISH from Vopr. Fiziol. Sensornykh System (Leningrad), 1967 82 p

(NMS-TRANS-2034; TT-67-62583; AD-656918)

An attempt is made to review in detail studies on mechanoreceptors, and in the light of these data, to discuss certain general principles in the organization and in the functioning of these sensory structures.

TAB

**N67-38325\*#** Alabama Agricultural and Mechanical Coll., Normal.  
**RADIATION EFFECTS ON THE METABOLISM OF PHOSPHOLIPIDS IN THE CENTRAL NERVOUS SYSTEM OF ALBINO RATS. MECHANISM OF ACTION OF X-RAYS ON PHOSPHOLIPIDS AND PRECURSORS Progress Report, Jan. 1-Jun. 30, 1967**

Charlotte O. Lee 23 Sep. 1967 17 p refs

(Grant NGR-01-001-003)

(NASA-CR-89073; PR-4) CSCL 06R

Studies on the isolation and characterization of breakdown products formed as a result of X-irradiation of phospholipids and

precursors are presented. Chromatogram plates containing the compounds ceramide, lysolecithin, phosphatidylserine, ethanolamine, choline chloride, and other phospholipids were irradiated directly; and chromatographic separation was completed in from five to twenty-six hours post radiation. G-values were calculated in some instances.

Author

**N67-38338** Atomic Energy Establishment, Winfrith (England). Radiological and Safety Div.

**THE MEASUREMENT OF PLUTONIUM-239 "IN VIVO"**

Progress Report

D. Ramsden and R. G. Speight Apr. 1967 31 p refs (AEW-R-494)

Experience in the operation of a prototype system for the detection and estimation of insoluble plutonium-239 in the lungs is described. The system consists of a low background xenon-filled, multiwire proportional counter used in conjunction with a large area, thin windowed, sodium iodide crystal. A realistic chest phantom is used to calibrate the detectors for plutonium-239 and americium-241. The variations in detector backgrounds caused by the presence of a human subject are described, and the sources of error and their magnitude arising both from the detection system and the calibration procedure are discussed in detail. The use of the equipment in a few cases of accidental inhalation of plutonium-239 is described. The limit of detection of the present equipment is given as 0.012  $\mu$ Ci Pu-239. The effect, on the lung detectors, of plutonium in the liver is briefly considered. Improvements in the chest phantom are suggested following an ultrasonic investigation of the soft tissue thickness on the chests of human volunteers of widely varying body builds.

Author

**N67-38362#** California Univ., Livermore, Lawrence Radiation Lab.  
**THE QUANTITATIVE NATURE OF THE RELATIONSHIP OF CORONARY ARTERY ATHEROSCLEROSIS AND CORONARY HEART DISEASE RISK**

John W. Gofman May 1967 19 p refs

(Contract W-7405-ENG-48)

(UCRL-50270) CFSTI: HC\$3.00/MF\$0.65

Quantitative considerations of the nature of the relationship of coronary heart disease (CHD) risk and degree of coronary artery atherosclerosis are reported. The methodology for determination of CHD risk from distributions of atherosclerosis in population groups and their respective CHD cases is presented in detail. The calculation of expected distribution of CHD cases is the inverse, if risk and base population distribution are available. Neither a linear rise in risk with increase in degree of atherosclerosis nor a more rapid than linear rise in risk is consistent with the observations concerning CHD. A sigmoid type of risk curve, with CHD risk rising rapidly at a particular degree of coronary atherosclerosis does explain the observations of Strong and his collaborators that CHD cases show comparable degrees of atherosclerosis even though they arise from base population groups differing widely in average degree of atherosclerosis. The implication for prophylaxis is that a marked drop in CHD risk and incidence might be achieved if degree of coronary atherosclerosis is kept to values just below the steeply rising portion of the CHD risk curve.

Author

**N67-38366#** School of Aerospace Medicine, Brooks AFB, Tex.  
**BEHAVIORAL CHANGES IN RATS AT GROUND LEVEL FOLLOWING GESTATION AND GROWTH IN 100% OXYGEN AT REDUCED PRESSURES** Final Report, Mar. 1966-Jan. 1967

Julian P. Cooke and William E. Pepelko Jun. 1967 11 p refs (SAM-TR-67-50; AD-657029)

After removal from a hypobaric normoxic environment (an altitude chamber containing 97% O<sub>2</sub> at a total pressure of 210 torr or 210 mm. Hg. absolute), exploratory activity of rats conceived, born, and raised in such an environment was measured from photographic light tracings made during the animals movements.

Within 15 minutes after the first encounter with room air at ground level, experimental animals displayed more exploratory activity than ground-level controls. No differences were measured 4 hours later, but a reduced amount of exploratory behavior occurred after 1 days exposure to room air at ground level. The extra amount of work necessary to ventilate the lungs owing to increased turbulence in the more dense air at ground level is believed to result in initial excitement and hyperactivity, followed by a reduction in movement as tiring occurs. Adaptation to room air at ambient pressures has apparently not been completed within 22 hours following a previous growth to maturity in a hypobaric normoxic environment.

Author (TAB)

**N67-38390#** Monsanto Research Corp., Dayton, Ohio.

**MINERAL NUTRIENT REQUIREMENTS OF CHLORELLA SOROKINIANA IN CONTINUOUS PURE CULTURE** Final Report, 1 Apr. 1964-29 Apr. 1966

H. Clyde Eyster Brooks AFB, Tex., School of Aerospace Med., 1 May 1967 60 p refs

(Contract AF 41(609)-2414)

(SAM-TR-67-40; AD-657031)

Mineral nutrient requirements of *Chlorella sorokiniana* under suitable sterile conditions were studied in a photothermostat and in two continuous culture units at constant densities of 2 microliters/ml. and 20 microliters/ml. Minimum, optimum, and maximum concentrations for each of the following essential elements are reported: N, P, Mg, S, K, Fe, Ca, Mn, Zn, and Cu. Additional studies with B, Mo, Co, Na, Cl, and ethylenediaminetetraacetate (EDTA) are also reported. Optimum nutrient requirements were compared at growing temperatures of 25 and 39C., and at 4.8% and 0.51% concentrations of carbon dioxide in air. The hydrogen ion requirement was determined. An optimal medium was formulated and evaluated in sterile phototherstatic and pure continuous cultures. The effluent medium was reconstituted after each harvest by replenishing the supernatant medium with essential elements and then was returned to the culture.

Author (TAB)

**N67-38391#** Washington Univ., Seattle.

**REPORT OF PROGRESS NUMBER 5**

Eugene Galanter 1 Jun. 1967 18 p refs

(Contracts Nonr-477(34); DA-49-193-MD-2713)

(PRP-34NA; AD-657305)

Progress is reviewed on problems of visual and auditory perception, memory, animal psychophysics, and human and animal reaction time.

TAB

**N67-38403#** Washington Univ., Seattle.

**EFFECTS OF COMPONENTS OF DISPLACEMENT STEP STIMULI UPON LATENCY FOR SACCADIC EYE MOVEMENT**

Michael G. Saslow 1 Sep. 1966 25 p refs

(Contract Nonr-477(34))

(PRP-28N; AD-657299)

The standard displacement step stimulus often used to produce lateral saccadic eye movements is considered in terms of the effects of its components: termination of stimulation at an initial fixation point, and onset of stimulation at a new, laterally displaced fixation point. If the termination and onset are simultaneous, saccade latency is about 200. msec. If there is a gap of 200. msec. or more between these events, latency decreases to about 150. msec. If the termination follows the onset by 100. msec. or more, latency increases to about 250. msec. Author (TAB)

**N67-38416\*** Arizona Univ., Tucson. Lab. of Tree-Ring Research.

**AN EVALUATION OF POSSIBLE RELATIONSHIPS BETWEEN SOLAR ACTIVITIES AND TREE-RING GROWTH IN WESTERN NORTH AMERICA** Semiannual Report

## N67-38422

Harold C. Fritts Sep. 1967 8 p  
(Grant NGR-03-002-101)  
(NASA-CR-88972) CSCL 02F

Proceedings from a seminar on "Solar-Dendroclimatic Relationships" are discussed and results of statistical analyses of various seminar-related topics are summarized. A topic outline for the seminar is included. It is concluded that predicting future sunspot variability and establishing relationships between tree rings and sunspots should be based on variability having a frequency of 20 or more years. Long term tree ring variance is considered to have good potential for predicting sunspot activity. E.C.

**N67-38422\*** Washington Univ., Seattle.

### AN EXPERIMENTAL CRITIQUE OF THE METHOD OF CONSTANT STIMULI AND SOME ALTERNATIVE PROCEDURES

Don A. Ronken [1967] 44 p refs Sponsored in Part by NASA  
(Contract Nonr-477(34))  
(NASA-CR-89282; PRP-31N; AD-657301) CSCL 05J

Some experiments investigating the constant error demonstrate that the method of constant stimuli is especially unsuited for studying such small effects of discrimination. The nature of the confounded data from the classical procedure suggests that the difficulty is of a fundamental nature and can be expected to influence the data under less stringent conditions as well. Some data from the literature are offered to support this view. Several alternative procedures are developed and evaluated experimentally, the most promising of which is shown to be a form of the XAB method.

Author (TAB)

**N67-38429\*** Research Triangle Inst., Durham, N. C. Engineering and Environmental Science Div.

### BIOMEDICAL APPLICATIONS TEAM Quarterly Progress Report, 15 Jun.-14 Sep. 1967

J. N. Brown, Jr. et al 14 Sep. 1967 23 p  
(Contract NSR-34-004-045)  
(NASA-CR-89265; EU-349; QPR-1) CFSTI: HC \$3.00/MF \$0.65 CSCL 06B

Activities of the Biomedical Applications Team this period with respect to specific biomedical problems are outlined. These activities are concerned with correction for latency in vidicons, a microforce transducer, pressure transducers for intra-cavity or subcutaneous implantation in the body, a signal conditioning and multiplexing system for multiple electrode EKG patient monitoring, simulation of coronary infarctions in experimental animals, a system for recording and performing simple data processing of evoked action potentials in smooth muscle tissue, fluid dynamics of sucrose gap chambers, methods of fabricating small sucrose gap chambers, preparing metallic powders from silver alloys, a sensor to measure teeth temperature to determine their viability, a method of obtaining single X-ray films of entire mouth, techniques of applying thermography to the mouth, photographing ultrasonic energy patterns, theoretical treatments of holography, continuous monitoring of capillary and small artery diameters, measuring velocities of red cells, methods for facilitating needle insertion into small arteries and veins, and a survey of transducers for monitoring physiological parameters. R.N.A.

**N67-38431\*** California Univ., Berkeley.

### [A SYSTEMS ANALYSIS STUDY OF THE PROPERTIES OF VEINS] Semiannual Progress Report, 1 Apr.-30 Sep. 1967

Loren D. Carlson 5 Oct. 1967 7 p  
(Grant NGR-05-004-031)  
(NASA-CR-88978) CSCL 08C

Progress on a systems analysis approach to the study of the venous circulatory system is reported. All equipment has been assembled and is operable with the exception of the tape recorder and its amplifiers. Efforts are underway to formulate and construct

a model for use as an analog and for simulation of a peripheral segment of the arm, hand, or leg. This systems approach is a formal way of proposing a hypothesis and of assigning values to known variables and parameters. Lumping and linearizing approximations are required in this system. R.N.A.

**N67-38436\*** Washington Univ., Seattle.

### OPERANT CONTROL OF RESPONSE LATENCY IN MONKEY: PERIPHERAL VS CENTRAL EXPLANATIONS

Carol A. Saslow [1966] 26 p refs  
(Contract Nonr-477(34); Grants PHS GM-666-06; NIH FR-00168; NIH MH-06722)  
(PRP-32N; AD-657302)

Two monkeys were trained to press a telegraph key in response to a tone and release it quickly to a subsequent light or click stimulus occurring after a variable interval. After training with a self-adjusting limited hold, minimum reaction time to click was 160 msec. and to light about 200. Temporal contingencies or payoff bands were then introduced which reinforced only latencies falling between two limits 50 msec. apart. Feedback was given as to whether the response latencies were too slow, on target, or too fast relative to the payoff band. A trained animal could precisely center his latency distribution on any 50-msec.-wide payoff band located from 200 to 600 msec. after the stimulus, with from 60 to 80% of his response latencies achieving reinforcement. Distribution statistics were comparable to those of trained human subjects. Because such precise timing might be accomplished by peripheral adjustment such as changing manner of holding key, latency of EMG activation was measured in participating arm muscles. EMG activation preceded key release by a constant interval, regardless of response latency, indicating a more central mechanism for timing of brief intervals. Author (TAB)

**N67-38446** Rome Univ. (Italy).

### STUDY OF THE CORRELATIONS BETWEEN CHROMOSOME ABERRATIONS AND DOSE IN SUBJECTS IRRADIATED FOR THERAPEUTIC PURPOSES [STUDIO DELLE CORRELAZIONI FRA LE ABERRAZIONI DEI CHROMOSOMI E LA DOSE NEI SOGGETTI IRRADIATI A SCOPO TERAPEUTICO] Annual Report, Jul. 1965-Jul. 1966

C. Biagini (Sassari Univ.), P. Brancadoro, and A. Siciliano Brussels. EURATOM, Aug. 1967 38 p refs In ITALIAN; ENGLISH summary  
(Contract EURATOM-035-64-5 BIOI)  
(EUR-3499.i)

The object of this research is to obtain quantitative information from the analysis of peripheral blood chromosomes of subjects exposed to part-body irradiation treatment. Groups of patients were studied before exposure and 24-72 hours after a single irradiation with doses varying from 10 to 1000 rad. The fragments, dicentric, chromosome breaks, complex anomalies, and the average number of breaks per anomalous cell were taken into consideration. An evaluation was also made, in the same samples, of the frequency of tetraploid as against diploid cells. The data were analyzed as a function of the skin dose and the integral dose. In spite of a high degree of variability in the data, the results show that aberrations increase with the dose, more noticeably as regards the number of fragments and the average number of breaks per anomalous cell. A study, limited to the persistence of aberrations at distances of time, was also conducted on a group of patients after a complete course of radiotherapy for malignant neoplastic forms. Author

**N67-38460\*** Northrop Corp., Hawthorne, Calif.

### INVESTIGATION OF PEROGNATHUS AS AN EXPERIMENTAL ORGANISM FOR RESEARCH IN SPACE BIOLOGY Summary Progress Report, 3 Jan.-30 Sep. 1967

B. G. Lindberg 30 Sep. 1967 19 p refs  
(Contract NASw-812)  
(NASA-CR-85387; NCL-67-60R) CFSTI: HC \$3.00/MF \$0.65  
CSCL 06C

Hypoxia induced hypothermia and hemoglobin oxygen affinity in the genus *Perognathus* were investigated. Details are presented on the techniques of obtaining blood samples from the pocket mice, and on the procedures for determining oxygen content. While, undiluted, and unbuffered blood at 41 mm CO<sub>2</sub> pressure was used. It was found that: (1) The *P. longimembris*, *P. formosus*, and *P. fallax* are able to rewarm from artificially induced hypothermia at a level well into the range occupied by a classical hibernator. (2) The half saturation values of the oxygen dissociation curve of whole blood generally fall within the expected range based on size. (3) Variation of hemoglobin-oxygen affinity at the species level is as great as the variation in intraspecific comparisons. (4) No direct correlation between high blood-oxygen affinity and ability to rewarm from induced deep hypothermia was noted. N.E.N.

**N67-38492\*** Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.

#### DYNAMIC BEHAVIOR OF EYE GLOBES

Robert H. Tuffias and Max Anliker Feb. 1967 147 p refs  
Sponsored in Part by NASA

(Contract N00014-C-00017-0007; Grant NIH NBO-6328-01)  
(NASA-CR-89004; SUDAAR-302; AD-657382) CSCL 06P

The eye globe was treated as a spherical shell (combined cornea and sclera) filled with (vitreous and aqueous) and surrounded by (tissue and fat) incompressible, inviscid, irrotationally flowing fluids. Its dynamic behavior was investigated by making use of the Flugge shell equations and the appropriate inertia terms. The axisymmetric case was solved in closed form, and the asymmetric case was solved numerically. Some qualitative results for physiologically meaningful parameter values are given. Static and dynamic experiments were performed on enucleated dog eyes. The static experiment measured the change in volume of the eyes as a function of time at various pressures. The results of this experiment indicated that the eyes were viscoelastic with an associated time constant of approximately 20 minutes. Author (TAB)

**N67-38513** National Academy of Sciences-National Research Council, Washington, D. C.

#### ECOLOGICAL BIOLOGY IN RELATION TO THE MAINTENANCE AND IMPROVEMENT OF THE HUMAN ENVIRONMENT

G. Evelyn Hutchinson *In its Appl. Sci. and Technol. Progr.* Jun. 1967 p 171-183 refs (See N67-38508 23-34)

Efforts to apply modern knowledge of ecological and evolutionary biology to promote human welfare are explored, and the very nature of ecology is discussed in terms of autecology and synecology (or systems ecology). Some aspects of the ecology of the atmosphere are included; and responsibility, understanding, and economics are mentioned in brief. Under psychological difficulties, fluorides and politics are noted; and under intellectual difficulties, an understanding of the population explosion is included. The roles of science, government, and education are considered; along with the general aims of present-day society. M.W.R.

**N67-38514** National Academy of Sciences-National Research Council, Washington, D. C.

#### APPLIED SCIENCE AND MEDICAL PROGRESS

Maurice B. Visscher *In its Appl. Sci. and Technol. Progr.* Jun. 1967 p 185-206 refs (See N67-38508 23-34)

Basic and applied sciences are considered in terms of how they can contribute to the greatest overall progress in medical fields, and some pertinent questions are asked to stress the need and value of basic research endeavors. Is applied research in medicine being neglected? How have some major practical advances

in medicine come about? A chronological approach to the rubella (German measles) vaccine research is detailed, and the basic research efforts that preceded the vaccine are noted. Both serendipity in medical research and the problem of priorities are also noted, as are some present and impending impediments to progress in applied research in medicine. Finally, problems of management and planning in medical research, both basic and applied, are discussed. M.W.R.

#### **N67-38524** Naval Personnel Research Activity, San Diego, Calif. AN EXPERIMENT IN BASIC AIRBORNE ELECTRONICS TRAINING. PART III: EFFECT OF REDUCTION IN PREVIOUS TRAINING UPON ABILITY TO LEARN OPERATIONAL EQUIPMENT

Alexander A. Longo and G. Douglas Mayo Mar. 1967 16 p refs

(STB-67-19; AD-656893)

A longitudinal study was made pertaining to whether training time can be reduced in basic airborne radar technician training through judicious revision of the course. The study compared the relative performance of two matched groups of 29 men each on the basis of their ability to learn a representative item of operational equipment for which the Aviation Electronics Technician (Radar and Radar Navigation System) is responsible. The results indicated that, despite the reduction of the original course from 30 weeks to 22 weeks, graduates of the revised course achieved the objectives of the representative equipment course as well as did graduates of the longer course. Based upon this information in conjunction with the information provided by the two previous reports and certain logical considerations, basic airborne radar technician training was reduced from 30 weeks to 25 weeks. Author (TAB)

**N67-38628** Oak Ridge National Lab., Tenn. Biology Div.

#### FACTORS AFFECTING CELL INJURY IN CRYOSURGICAL FREEZING

Peter Mazur [1967] 9 p Presented at the Conf. on Cryobiol. and Cryosurgery, Buffalo Submitted for publication  
(Contract W-7405-ENG-26)

(ORNL-P-3103; CONF-670529-1) CFSTI: HC \$3.00/MF \$0.65

A discussion is presented on the physico-chemical factors underlying injury in single cells at sub-zero temperatures: effects of lowered temperature and events in single cells during ice formation and methods for maximizing the effectiveness of cryosurgical freezing. It was concluded that the likelihood of killing all cells in a target area could probably be increased by subjecting the target to two or more cycles of freezing (below -20°C) and slow thawing. NSA

**N67-38633** Atomic Energy of Canada, Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.

#### HEALTH PHYSICS APPLICATIONS OF A THIN SILICON DETECTOR

Eli Yablonoitch Aug. 1967 14 p refs

(AECL-2766) CFSTI: HC \$3.00/MF \$0.65

A totally depleted, silicon, dE/dx counter (200 microns thick) was tested for use in general purpose dosimetry. The response to  $\alpha$ ,  $\beta$ , and  $\gamma$ -rays as well as to fast neutrons is presented and the measurements indicate a detector of unusual versatility. Author

**N67-38659** Washington Univ., Seattle.

#### SYSTEMATIC BIASES IN EYE MOVEMENT LATENCY DATA

M. G. Saslow and C. A. Saslow [1966] 9 p refs

(Contract Nonr-477(34))

(PRP-27N; AD-657297)

The investigation was designed to estimate systematic time trends over sets of hundreds of trials, and to suggest methods for their compensation, in the study of human lateral saccadic eye

movements. A disjunctive latency paradigm, with four mutually exclusive lateral displacements from a central fixation point, was in use in order to combat time estimation biases often found in simple latency paradigms. Author (TAB)

**N67-38660\*** Hazleton Labs., Falls Church, Va.

**A STUDY TOWARD DEVELOPMENT OF AN AUTOMATED MICROBIAL METABOLISM LABORATORY Final Report, 1 Oct. 1966-31 Aug. 1967**

31 Aug. 1967 232 p refs

(Contract NASw-1507)

(NASA-CR-88989) CFSTI: HC\$3.00/MF\$0.65 CSCL 06M

Metabolic parameters for life detection have been successfully demonstrated by phosphate uptake, sulfate uptake, and ATP production of Earth-born microorganisms using RM9- $^{35}\text{SO}_4$ -S medium. Phosphate uptake was determined by measuring decrease of phosphate concentration in supernatant of the test medium. Sulfate uptake was shown by accumulation of  $^{35}\text{SO}_4$ -S in cells. ATP production was demonstrated by ATP assay of the cells extracted by DMSO through subsequent injection of the extracted ATP into firefly luciferase, luciferin, and other reagents for light response. Author

**N67-38708\*** CBS Labs., Stamford, Conn.

**DEVELOPMENT OF AUDIO TRANSDUCER HELMET ASSEMBLY Quarterly Report, 2 Jan.-31 Mar. 1967**

Allan J. Rosenheck and Alfred L. DiMattia Jul. 1967 23 p

(Contract DAAB07-67-C-0204)

(ECOM-0204-1; Rept.-1; AD-656938)

Program objective is the development of an Audio Transducer Helmet Assembly to be used in the Army Aircrewman Helmet. The assembly includes earphones mounted in attenuating earcups along with auxiliary hardware, wiring and ancillary devices. A further goal is development of a miniature moving-coil, noise-cancelling microphone having improved noise-cancellation characteristics. A comprehensive review of previous efforts was performed including evaluation of the enclosure presently used on the APH-5 helmet and a survey of several novel ear enclosure concepts under recent Army contracts--low-frequency-coupled volumes, low-profile ear enclosures, gel-filled cushions, mutual-stiffness-coupled and bellows-coupled enclosures. Evaluation and comparison of these and other methods revealed that low-frequency-coupled volumes or low-profile enclosures, in conjunction with gel-filled cushions, are most feasible for this application. Assessment was made of the space available in the present helmet for enclosures with a goal of avoiding an increase in the external ear-to-ear measurement. Various techniques of mounting the enclosures within the helmet were explored and experiments performed toward optimizing the gel-filled cushion design. Author (TAB)

**N67-38724\*** Washington Univ., Seattle.

**MONOCULAR BRIGHTNESS AND FECHNER'S PARADOX**

Davida Y. Teller and Eugene Galanter [1966] 18 p refs

(Contract DA-49-193-MD 2713)

(PRP-30A; AD-657331)

Monocular brightness were varied without varying monocular luminances, both by means of simultaneous contrast and by means of changes in the level of dark adaptation. Binocular brightness was shown to change in accord with monocular brightness changes. Author (TAB)

**N67-38806\*** Martin Co., Baltimore, Md.

**ANALYSIS OF CREW PERFORMANCE IN THE APOLLO COMMAND MODULE, PHASE II. VOLUME I**

Milton A. Grodsky and David L. Glazer Jan. 1967 99 p refs

(Contract NAS9-5730)

(NASA-CR-65757; ER-14396, Vol. I) CSCL 05H

Results of the Phase II analyses concerned with the evaluation of pilot performance data obtained in a ground-based simulation

situation of the Apollo lunar landing mission, are presented. The analyses were designed to obtain statistically verifiable information and factors which relate pertinent aspects of the operational situation to pilot performance. The effects of the following variables were quantitatively studied: (1) checklists, (2) communications blackout periods, (3) control response to changing spacecraft inertia, (4) isometric exercises, (5) diurnal cycle variations, and (6) mission-to-baseline correlates. Pilot performance obtained in five lunar landing simulations were investigated relative to system design and mission parameters of the Apollo Command Module (CM). L.S.

**N67-38807\*** Hughes Research Labs., Malibu, Calif.

**RESEARCH AND DEVELOPMENT PROGRAM FOR RADIATION MEASUREMENTS OF RADIOBIOLOGICAL HAZARDS OF MAN IN SPACE Summary Technical Report, 1 Aug. 1966-31 Jul. 1967**

31 Jul. 1967 55 p refs

(Contract NAS2-2366)

(NASA-CR-73146) CFSTI: HC\$3.00/MF\$0.65 CSCL 06R

Center line depth dose studies were conducted with high energy protons in an effort to develop methods for measuring the radiobiologically significant dosimetric quantities to be used for evaluating radiation hazards associated with manned space flights and for evaluating high energy proton irradiation of tissue cells and whole animals. Frequency distribution data plots for microscopic energy deposition spectra of protons passing through gaseous mixtures of helium and carbon dioxide, through water, and through tissue equivalent plastic, are presented and discussed. L.S.

**N67-38809\*** Swift and Co., Chicago, Ill. Research and Development Center.

**[ADVANCED BLADDER TECHNOLOGY] Interim Report Ending 31 Jul. 1967**

Harland H. Young 31 Jul. 1967 33 p

(Contract NAS7-487)

(NASA-CR-89278) CSCL 06A

The behavior of gelatin when tested with a torsion pendulum is examined with emphasis on the properties of gelatin after being subjected to cryogenic temperature ranges. Studies were focused on providing protein films of different thickness derived from various gelatins. The use of plasticizers, crosslinking agents, and reinforcing fibers in these films at various levels was also considered. Tabulated data are included on gas impermeability and tensile strength determinations. S.P.

**N67-38812\*** Stanford Research Inst., Menlo Park, Calif. Life Sciences Research.

**DIRECT INNERVATION OF CAPILLARY ENDOTHELIAL CELLS IN THE LAMINA PROPRIA OF THE FERRET STOMACH**

R. J. Stephens and C. J. Pfeiffer [1967] 7 p refs Submitted for publication

(Contract NAS2-3559)

(NASA-CR-73139) CFSTI: HC\$3.00/MF\$0.65 CSCL 06C

An electron microscope study on ferret stomach tissue showed that single neurons were separated from the nerve bundle, surrounded by a basement membrane, and unaccompanied by any Schwann cell cytoplasm. Specialized finger-like projections were observed at the end of the neurons which penetrate the basement membrane of the capillary endothelium and come into membranous contact with the external plasma membrane of the endothelial cells. The neurons making membranous contact with the endothelium are regarded as afferent sensory fibers which possibly respond to stimuli contained in the blood. Since gastric secretion is markedly influenced by hormones produced lower in the digestive tract, these nerve endings may be important in regulating a reflex mechanism responsible for gastric control. Another possibility is that the nerve endings are pressure sensitive and are linked via a

reflex to the precapillary sphincters permitting a feedback to the sphincter.  
R.N.A.

**N67-38814\*** Martin Co., Baltimore, Md.  
**ANALYSIS OF CREW PERFORMANCE IN THE APOLLO  
COMMAND MODULE, PHASE II. VOLUME II: APPENDIX**

Oct. 1966 109 p  
(Contract NAS9-5730)  
(NASA-CR-65758; ER-14396, Vol. II) CSCL 05H

This appendix contains tabulated pilot raw scores on selected flight control parameters, and graphic data on individual pilot isometric performance and diurnal variation of biomedical status by individual pilot.  
R.N.A.

**N67-38824\*#** Minnesota Univ., Minneapolis  
**THE BACTERIOLOGY OF CLEAN ROOMS**

G. S. Michaelsen, O. R. Ruschmeyer, and D. Vesley Washington, NASA, Oct. 1967 72 p refs  
(Grant NSG-643)  
(NASA-CR-890) CFSTI: HC\$3.00/MF\$0.65 CSCL 06M

Work accomplished in three areas of space hardware sterilization is recapitulated: (1) microbiological surveys of industrial clean rooms, (2) hand contact contamination experiments, and (3) evaluation of a vertical laminar flow room. The clean room study focused on four conventional industrial clean rooms selected on the basis of existing contamination controls. Ambient airborne contamination levels, surface contamination on work benches, and fallout of contaminants onto stainless steel strips left in the work area for periods up to 21 weeks were investigated. Heat resistant isolates from these strips were later identified and studied for relative resistance to dry heat. Hand contact contamination experiments included investigation of the effect of composition of materials on retention and survival of contaminants, die off of contaminants on handled strips of various materials, and heat resistance studies of contaminants on handled strips. Design and operation of the vertical laminar flow room are described. Extensive tables, charts, and graphs based on the investigative work are included.  
E.C.

**N67-38840\*** IIT Research Inst., Chicago, Ill. Technology Center.  
**POWER DRIVEN ARTICULATED DUMMY Final Report, May  
22, 1963-Jul. 31, 1965**

J. Slowik 14 Dec. 1965 234 p  
(Contract NAS9-1370)  
(NASA-CR-65740) CSCL 05E

Details are presented on the dummy, which can simulate human motions, for qualitatively sensing the forces imposed by a space suit. It is hydraulically powered and remotely controlled. The dummy simulates thirty-five basic human motions and can be adjusted to approximate in size the five to ninety-five percentile man. The electrical, hydraulic, and mechanical systems use present state-of-the-art components and techniques. The actuators and control valves for the power supply systems are described, and the electro-hydraulic control system is outlined. Strain gauges were chosen for the torque sensor system. Diagrams of the motion capabilities, circuit diagrams, and mechanical drawings, and parts lists are appended.  
N.E.N.

**N67-38855\*#** Stanford Research Inst., Menlo Park, Calif. Life Sciences Div.

**ULTRASTRUCTURAL CHANGES OF THE PARIETAL CELL  
IN THE FERRET GASTRIC MUCOSA INDUCED BY  
PYLORUS-LIGATION AND GLUCOCORTICOID ADMINIS-  
TRATION**

C. J. Pfeiffer and R. J. Stephens [1967] 19 p refs Submitted for publication  
(Contract NAS2-3559)  
(NASA-CR-73138) CSCL 06C

The study was performed on 40 female adult ferrets, maintained on a diet of canned dog food. It was found that pylorus-ligation for 48 hours causes the formation of numerous concentrically arranged smooth membranes within the cytoplasm of the parietal cell. These inclusions are comprised of one to five or more membranes which contain a small amount of cytoplasm and free ribosomes. Mitochondria are widely separated in comparison to the normal parietal cell, and the secretory canals are less extensive and "collapsed." Glucocorticoid administration brings about an additional alteration in the dense bodies of the parietal cell. An electron lucid area develops within the dense body and increases in size until it fills much of the volume of the organelle. The diameter of the dense bodies increases two- to three-fold and their number is also increased. Chief cells are apparently unaffected by these treatments.  
Author

**N67-38942\*** Massachusetts Inst. of Tech., Cambridge.  
Engineering Projects Lab.

**SIMULATION STUDY OF THE DRIVER'S CONTROL FOR  
SUDDEN CHANGES IN PREVIEWED PATH**

R. D. Roland and T. B. Sheridan Jun. 1967 58 p refs  
(Grants NSG-107; PHS AC-00206)  
(NASA-CR-89272; DSR-74920-1) CSCL 05H

Results of three different types of visual automobile driving simulation tests are presented and discussed. The tests consisted of: 1) an abstract spot moving on an oscilloscope, 2) a television picture resulting from a television camera driven by a model car through a model environment, and 3) an actual car driven through a test course. The driver subject in each case was asked to steer his vehicle so that its trajectory would successively coincide with one or more targets which suddenly appeared in his view ahead in pseudorandom positions. Forward velocity was not under the subject's control. The effects of preview time, the effect of target configurations (and their number), and the variability of trajectories for the same target configuration on the response of the subjects were studied.  
L.S.

**N67-38956#** Federal Aviation Agency, Oklahoma City, Okla.  
Office of Aviation Medicine.

**ADAPTATION TO VESTIBULAR DISORIENTATION. V:  
EYE-MOVEMENTS AND SUBJECTIVE TURNING RESPONSES  
TO TWO DURATIONS OF ANGULAR ACCELERATION**

William E. Collins and Fred E. Guedry, Jr. May 1967 21 p refs  
(AM-67-6)

Influences of the duration of angular acceleration on turning sensations and on nystagmic eye movements which can blur vision are relevant to understanding vestibular reactions during certain aircraft accelerations. Ocular recordings were obtained from human subjects and cats to  $4^\circ/\text{sec}^2$  angular accelerations of 8.4 sec and of 36 sec duration. Lateral and vertical canals were stimulated on separate trials with output of both primary and secondary nystagmus greater for the lateral canals. In cats, both lateral- and vertical-canal responses to 36-sec stimuli peaked and then steadily declined after 15-21 sec of angular acceleration. Declines were not apparent in nystagmus of human subjects. In an additional test, humans were given special tasks and cats received d-amphetamine with essentially the same results as described above. Other group differences were noted. Cats consistently demonstrated secondary nystagmus whereas humans did not. After termination of acceleration, primary nystagmus from cats lasted longer and exhibited a greater number of eye movements following 8.4 sec stimuli than following 36 sec stimuli; this consistency was not evident in humans. However, for humans sensations of motion following termination of acceleration were longer for the 8.4 sec stimuli than for 36-sec stimuli. In this regard, nystagmus from cats resembled the subjective reactions of man more than they did the nystagmus of man.  
Author

**N67-38998** Joint Publications Research Service, Washington, D. C.

**POSSIBILITIES AND PROSPECTS OF THE USE OF HYPOTHERMIA IN THE EXPLORATION OF SPACE**

P. V. Byeloshyts'kyy et al 21 Sep. 1967 12 p refs Transl. into ENGLISH from Fizol. Zh., Akad. Nauk Ukr. RSR (Kiev), v. XIII, no. 4, 1967 p 490-495 (JPRS-42709; TT-67-33336)

Laboratory investigations on the effects of hypothermia on animals are reported. In the first series of tests, a method of combined air cooling and contact cooling was used, and the test animals were subjected to hypoxia, acceleration, decompression, and irradiation. The changes in physiological reactions were measured and are discussed. It was found that the configuration of the ECG was changed significantly. The protective role of hypothermia was most evident in connection with decompression, but was also established for acceleration and irradiation. Hypothermy resulted in ill effects in direct proportion to intensity and duration. A second series of tests were conducted to determine the relationship of hypothermized rats with carbon dioxide and injections of aminazine. It was found that prolonged hypothermia remains hazardous. Finally, squirrels (*Citellus citillus*) and marmots were released at high altitudes in the Caucasus where conditions are severe and food is scant, and were found to adapt well. It is concluded that aspects of hibernation can be utilized in space exploration. N.E.N.

**N67-39005** Joint Publications Research Service, Washington, D. C.

**SPACE BIOLOGY AND MEDICINE, VOLUME 1, NO. 2, 1967** 18 Sep. 1967 151 p refs Transl. into ENGLISH of Kosmich. Biol. i Med. (Moscow), v. 1, no. 2, 1967 p 1-88 (JPRS-42635; TT-67-33263) CFSTI: \$3.00

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17. THE EFFECT OF VIBRATION AND NOISE ON THE MENTAL FACULTY OF MAN UNDER TIME STRESS K. K. Ioseliani p 118-129 refs (See N67-39022 23-04)

**N67-39006** Joint Publications Research Service, Washington, D. C.

**RADIATION AND SPACE FLIGHT**

Yu. G. Grigor'yev, Ye. Ye. Kovalev, and V. N. Pravetskiy *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 1-6 (See N67-39005 23-04)

A brief discussion is presented of the problems connected with developing a spacecraft radiation protection system and its associated ground support equipment. Basic objectives of such a system are outlined, along with the various instrumentation requirements. C.T.C.

**N67-39007** Joint Publications Research Service, Washington, D. C.

**PROBLEMS OF AUTOMATION OF OPERATIVE MEDICAL CONTROL IN SPACE FLIGHT**

B. B. Yegorov, A. D. Yegorov, A. A. Kiselev, and I. S. Shadrintsev *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 7-18 refs (See N67-39005 23-04)

Problems of the automation of an operative medical control with the use of onboard and ground computers are discussed. A diagram of automation is suggested which involves a comparison of confidence sets for the physiological indices recorded in flight and during simulation. Equations are given for models of changes in physiological indices involving various flight factors. Application of analytical methods (variance, regression, and covariance analyses) makes it possible to determine changes in physiological indices and detect the factor or factors responsible for the changes. Author

**N67-39008** Joint Publications Research Service, Washington, D. C.

**WAYS TO DEVELOP SPACE PSYCHOLOGY**

B. S. Alyakrinskiy *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 19-30 refs (See N67-39005 23-04)

The problems, methods, and principles inherent in the development of space psychology are briefly discussed. Consideration is given to such areas as man's psychic work capacity, the status of his cognitive functions and emotional-pain sphere, and his general and professional behavior. Weightlessness is cited as the most specific space flight factor, and the effect of this factor on the human body as a whole and on man's psyche in particular is discussed. C.T.C.

**N67-39009** Joint Publications Research Service, Washington, D. C.

**STUDY OF THE CUMULATIVE EFFECT OF IMPACT ACCELERATIONS**

S. A. Gozulov, N. P. Morozova, and V. A. Elivanov *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 31-37 refs (See N67-39005 23-04)

Experiments on rats were performed to study the cumulative effect of impact accelerations of 600 G revealed at postmortem examinations. The accelerations were applied at various intervals and subcritical landing velocities. The cumulative lesions resulting from repeated exposures at one hour intervals were detected as the primary lesion of the lungs similarly to the effect of a single exposure at supercritical velocities. Lesions developed after a comparatively small number of repeated exposures (3 to 5) for a wide range of subcritical velocities (7 to 4-5 m/sec). The aftereffect period covers over 24 hours and is related to reactive changes in individual organs.

Author

**N67-39010** Joint Publications Research Service, Washington, D. C.

**CERTAIN ASPECTS CONCERNING OXYGEN METABOLISM OF THE BODY EXPOSED TO PROLONGED ACCELERATIONS**

Ye. I. Sorokina *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 38-43 refs (See N67-39005 23-04)

Changes in oxygen metabolism of muscular and brain tissues of animals exposed to prolonged transverse accelerations (oxygen tension and redox potential) are described. The paper also discusses the total oxygen consumption and body temperature under the same conditions. A many-faceted approach to the processes studied allows one to establish new regularities in oxygen metabolism of muscular and brain tissues. Their evaluation helps to understand the role of the changes in tolerance of the body for accelerations

Author

**N67-39011** Joint Publications Research Service, Washington, D. C.

**EFFECT OF HYPOXIA ON THE CELLULAR AND HUMORAL IMMUNITY OF MICE**

A. S. Kaplanskiy, G. N. Durnova, and N. A. Roshchina *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 44-51 refs (See N67-39005 23-04)

The effect of hypoxia on the protective mechanisms of the animal body was studied on mice exposed to 378 mm Hg for 20 days. Hypoxia was shown to increase the animal sensitivity to bacterial infection (*S. typhi*) and to inhibit cellular immunity (the phagocytic activity of neutrophils and macrophages decreased). The production of antibodies and the development of hyperplasia of the cell plasma in lymph nodes were not disturbed at the stipulated atmospheric pressure. Hypoxia led to hypoplasia of the lymphoid tissue, most of the lymphocytic cells disappearing.

Author

**N67-39012** Joint Publications Research Service, Washington, D. C.

**ON THE OBJECTIVE EVALUATION OF BODY REACTIVITY**

L. Novak *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 52-56 refs (See N67-39005 23-04)

The response of the body to applied stimuli usually is manifested in metabolic changes. However, the objective evaluation of body reactivity has been given too little attention. The scatter of physiological parameters often is very great, thus making impossible an adequate evaluation of the small difference in the reaction of test subjects. A new method for objective evaluation of body metabolism has been developed. The method is based on a comparison of the measured value and the value computed for a biophysical model of the investigated function. The biophysical model is so constructed as to include the factors which may affect the value of the measured function. The observed difference between

the computed and measured values reflects the changes in the regulatory mechanisms of the test subject because changes caused by other factors are involved in the computed value of the biophysical model.

Author

**N67-39013** Joint Publications Research Service, Washington, D. C.

**STUDY OF THE BIOLOGICAL VALUE OF PLANT PROTEINS IN RELATION TO THEIR USE IN A CLOSED LIFE-SUPPORT SYSTEM**

N. S. Klyushkina, V. I. Fofanov, and I. T. Troitskaya *In its Space and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 57-64 refs (See N67-39005 23-04)

The effect of diets including proteins of unicellular green algae or soybeans as the only protein source upon the animal body was studied on two generations of white rats. The proteins of the algae had a quite high biological value in comparison with those of a casein diet. The progeny of test animals appeared to be more viable than those of the control rats. The biological value of soybean proteins was considerably lower than that of algae.

Author

**N67-39014** Joint Publications Research Service, Washington, D. C.

**PHYSIOLOGICAL REGENERATION OF THE EPITHELIUM OF THE CORNEA AND INTESTINE UNDER CONDITIONS OF FRACTIONAL IRRADIATION BY FISSION NEUTRONS**

V. M. Mastryukova and A. D. Strzhizhovskiy *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 65-71 refs (See N67-39005 23-04)

A study was carried out to determine the mitotic index and content of chromosomal aberrations in the epithelial cells of mice exposed to fractional irradiation by fission neutrons with doses of 50, 125 and 50 rad/week. Under these conditions compensatory processes increasing the tissue resistance to further irradiations developed in the epithelium of the cornea and intestines. This eliminated an increasing damage of mitotic activity and the genetic structures of cells. Therefore, the tissues developed an equilibrium state whose characteristics depended on the dose rate.

Author

**N67-39015** Joint Publications Research Service, Washington, D. C.

**ON THE IMPROVEMENT OF SOME POLYVINYL CHLORIDE POLYMERS AND DECREASE OF THEIR TOXICITY**

G. M. Gorban' and V. D. Yablochkin *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 72-79 refs (See N67-39005 23-04)

Polyvinyl chloride materials used to insulate electric wires in spaceship cabins are a source of contamination of the closed atmosphere with different toxic compounds, such as carbon monoxide, carbohydrates, hydrogen chloride, dibutyl phthalate, aldehydes, and fatty acids. A method was developed for reducing the release of gas by polyvinyl chloride tapes with a 50% urea solution. The reduction of contamination by the treated samples was 100%. The treatment completely eliminated carbohydrates, hydrogen chloride, and fatty acid and significantly reduced the concentrations of carbon monoxide and aldehydes, their levels attaining the maximum admissible concentrations of the substances in atmospheric air. The method does not impair the insulating and mechanical properties of polyvinyl chloride tapes and films.

Author

**N67-39016** Joint Publications Research Service, Washington, D. C.

**EXTREMAL FACTORS OF LONG-TERM SPACE FLIGHT AND HEALTH REQUIREMENTS FOR SPACECRAFT CREWS**

P. V. Buyanov and V. G. Terent'yev *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 80-83 refs (See N67-39005 23-04)

Medical selection of spacecraft crews for long-duration space missions is discussed. In view of individual differences in functional limits and tolerance to flight factors, it is suggested to base physical aptitude requirements for candidates on the effect of environmental space flight factors upon the human organism and its tolerance limits. Positive selection is predicated on satisfactory resistance to space-simulation tests (acceleration, physical stress, oxygen starvation, orthostatic tests). Author

**N67-39017** Joint Publications Research Service, Washington, D. C.

**STUDY OF THE WORK AND REST CYCLES OF TEST SUBJECTS EXPOSED TO RELATIVE ISOLATION**

N. N. Gurovskiy, B. A. Dushkov, and F. P. Kosmolinskiy *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 84-89 refs (See N67-39005 23-04)

Results of two 15-day experiments on three test subjects in a sealed chamber, with 24- and 18-hour rest and work cycles, are given. The 18-hour cycle had a greater effect on psychic functions, cardiovascular system, and nervous and muscular activity, and caused more pronounced biochemical changes, indicating the development of nervous and emotional stress. Objective and subjective observations on reaction of the organism to the two cycles are tabulated and plotted. Author

**N67-39018** Joint Publications Research Service, Washington, D. C.

**STUDY OF SLEEP CHARACTERISTICS UNDER CONDITIONS OF SIMULATED MANNED SPACE FLIGHT**

V. I. Myasnikov *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 90-96 refs (See N67-39005 23-04)

To determine factors for protecting spacecraft crews on long-duration missions from environmental hazards and physiological stress, characteristics of sleep patterns in their relation to adaptation and resistance of the organism, were studied. Data are given on reactions to protracted exposure to noise, angular acceleration, and isolation in their effect on sleep. Impairment of sleep included difficult wake-sleep transition, semiwakefulness, etc. Correlation of sleep with functional changes is demonstrated with respect to motion sickness and impaired acoustic adaptation. The significance of differential diagnosis of somnolent, precollaptoid, and fatigue states is emphasized. Author

**N67-39019** Joint Publications Research Service, Washington, D. C.

**CHANGE IN MOVEMENT COORDINATION IN MAN AFTER PROLONGED CONFINEMENT IN A SMALL CHAMBER**

B. A. Dushkov *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 97-105 refs (See N67-39005 23-04)

Biodynamic structures of a complex highly automatized act (walking) and specially chosen movements were studied prior to, during, and following 17- and 19-day chamber experiments. Prolonged hypodynamia was shown to disturb the cyclic interaction of structures involved in the motor act and to impair the coordination of biodynamic elements of the neuromotor apparatus in active poses. When developing physical exercises for peculiar conditions, it is recommended to take into consideration the disorders revealed in the human motor coordination (changes of the tempo and rhythm of the activity, physical efforts, and pose). Author

**N67-39020** Joint Publications Research Service, Washington, D. C.

**EFFECT OF ACCELERATION AND HYPOKINESIA ON THE FUNCTIONAL STATE OF THE STOMACH**

P. I. Yegorov, K. V. Smirnov, M. M. Korotayev, and M. V. Lukasheva *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 106-110 refs (See N67-39005 23-04)

The experiments were performed on 5 male test subjects who were twice exposed to chest-to-back accelerations of 11.9-14.5 G with an interval of 4-6 days. After the exposures the test subjects remained in the state of hypokinesia for 2 months. Then they were again exposed to accelerations of 11-16 G. The exposure to accelerations inhibited the secretory and enzyme-forming gastric functions. The acidity of the intestinal juice showed a tendency to increase. Hypokinesia conditions produced further inhibition of the glandular apparatus of the stomach. Author

**N67-39021** Joint Publications Research Service, Washington, D. C.

**CHANGE IN WATER-SALT METABOLISM DURING 62-DAY HYPOKINESIA**

Ye. N. Biryukov, L. I. Kakurin, G. I. Kozyrevskaya, Yu. S. Koloskova, Z. P. Payek et al *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 111-117 refs (See N67-39005 23-04)

The water-salt metabolism was studied on 6 healthy young men in a 62-day bed-rest experiment. Prior to the experiment they were exposed to accelerations of 13 to 15 g. The diet consumed provided 3000 to 3500 cal/day. The amount of water consumed and urine excreted as well as the diuresis rate were investigated. The electrolytic composition of the blood, urine, and feces was determined. The 62-day bed rest resulted in a decrease of water consumption, a change of the diuresis rate, and a shift of the electrolytic composition of urine and feces. The changes were of a phasic character. Two periods can be distinguished in the dynamics of water-salt metabolism: the stage of reconstruction covering 3 to 4 weeks and that of a relative stabilization of metabolism at the level adequate to the new conditions. Peculiarities of the shifts revealed in water-salt metabolism indicate the development of dehydration and decalcification. Author

**N67-39022** Joint Publications Research Service, Washington, D. C.

**THE EFFECT OF VIBRATION AND NOISE ON THE MENTAL FACULTY OF MAN UNDER TIME STRESS**

K. K. Ioseliani *In its Space Biol. and Med.*, Vol. 1, No. 2 18 Sep. 1967 p 118-129 refs (See N67-39005 23-04)

The effect of vibration and noise on the mental capacity of man under time stress was studied on 60 examinees in the age group of 25-45 years. Prior to, during, and upon termination of the vibration effects the examinees did addition and subtraction of numbers presented at varying speeds by following the procedure of "continuous counting at a given rate". Investigations demonstrated that the influence of total vertical vibrations at a frequency of 70 cycles per second and an amplitude of 0.4 mm reduces on the average as much as 1.5-2 times the qualitative accomplishment of the experimental task. The effect of noise at 90 decibels cuts the qualitative accomplishment of the task on the average in half. The deepest and most persistent reduction of the mental efficiency is caused by action of a complex irritant—"vibration and noise". The reduction of mental efficiency is greater, the greater the time stress. Author

**N67-39027#** Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.

**ADAPTATION TO VESTIBULAR DISORIENTATION. VII: SPECIAL EFFECTS OF BRIEF PERIODS OF VISUAL FIXATION ON NYSTAGMUS AND SENSATIONS OF TURNING**

William E. Collins May 1967 22 p refs (AM-67-12)

The influences of disorientation experience and brief periods of visual still fixation were examined in exposing figure skaters

and ordinary subjects to various rates of angular acceleration. Both nystagmic eye movements and sensations of turning were recorded. Skaters produced significantly less primary slow-phase eye displacement than did non-skaters, but the groups did not differ in number of eye movements nor in duration of nystagmus. Introduction of the visual still-fixation period significantly shortened primary nystagmus and produced an accentuated secondary nystagmus for both groups. The term "habituation" (a dropping out of responses), used to define the effects of repeated vestibular stimulation, does not appear to describe completely the active process of change evidenced in the nystagmic tracings presented in this and other studies. Durations of turning sensations were shorter for skaters than non-skaters. For both groups the period of room illumination, allowing subjects actively to fixate on stationary visual objects, significantly shortened or abruptly terminated the subjective reaction.

Author

**N67-39033\*** George Washington Univ., Washington, D. C.

**QUARTERLY REPORT, JULY 1-SEPTEMBER 30, 1967**

30 Sep. 1967 325 p refs

(Contract NSR-09-010-027)

(NASA-CR-89313) CSCL 06C

This report concerns the Biological Sciences Communication Project and contains the following: (1) a section on planetary quarantine which briefly summarizes current activities and lists a reference bibliography on sterilization techniques; (2) a synopsis of activities in bioscience communications followed by contractual listings of publications supported by the Bioscience Program and covering environmental biology, exobiology, and physical biology; (3) a selected bibliography on radiobiology covering the years 1959-1967; (4) a monograph series outline and author commitments on works dealing with space biology and medicine; (5) a summary of the biosatellite program and news items on COSPAR, both as presented in No. 15 of the publication *Bioscience Capsule*; and (6) mailing lists and correspondence regarding the program. K.W.

**N67-39049\*** Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.

**A PREVIEW CONTROL MODEL WITH ONE OR TWO FAST TIME SCALE LOOPS**

Richard Allen Miller (M.S. Thesis) Aug. 1967 102 p refs

(Grant Nsg-107)

(NASA-CR-89264; DSR-70283-4) CSCL 05H

This thesis was concerned with development of a model of the human operator in control situations where the human can view the future input. The modeling technique used either one or two dynamic models of the controlled plant, operating in time scales faster than real time, to produce an estimate of the future response of the plant. This simulated the human's ability to estimate future responses. The preview problem was treated as an optimization problem and was solved analytically via the calculus of variations. It was shown that the use of fast-time predictor models provided a stable method of numerically solving the resultant two point boundary value problem. Additional fast models resulted in better future response estimation with the final system output approaching the optimum. Extensive computer simulations were performed and the results for step and continuous inputs reported. Two human subjects were tested and their average responses matched by the preview control model discussed. For the plants used the match was of good quality.

Author

**N67-39083#** General Electric Co., Philadelphia, Pa. Missile and Space Div.

**EXISTENCE THEOREMS FOR A NONLINEAR PARTIAL DIFFERENTIAL EQUATION OF VISCOUS, INCOMPRESSIBLE FLOW**

Alan Ross Elcraat Aug. 1967 50 p refs

(R67SD43)

An existence theorem is proven for a nonlinear partial differential equation for the velocity in time dependent flow of a viscous incompressible fluid through a tube of compliant material. The flow problem is meant to represent the flow of blood in a large relatively straight channel. Existence is shown by dealing with a problem in a space-time region containing the original one that implies the desired existence for the original problem. The problem in the larger region is dealt with by putting it in a setting in which the differential operator involved maps one Banach space into another continuously and is twice Frechet differentiable.

Author

**N67-39097** Joint Publications Research Service, Washington, D. C.

**SPACE BIOLOGY AND MEDICINE, VOLUME I, NO. 3, 1967**

22 Sep. 1967 164 p refs Transl. into ENGLISH of Kosmich. Biol. i Med. (Moscow), v. 1, no. 3, 1967 p 1-94

(JPRS-42730; TT-67-33357) CFSTI: \$3.00

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**N67-39098** Joint Publications Research Service, Washington, D. C.

**ON THE PREHISTORY OF DEVELOPMENT OF SPACE BIOLOGY AND MEDICINE**

I. M. Khazen *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 1-8 refs (See N67-39097 23-04)

A brief review is presented of the development of space biology and medicine in Russia. Some of the significant accomplishments during this development are cited. C.T.C.

**N67-39099** Joint Publications Research Service, Washington, D. C.

**ON THE NUTRITION PROBLEM DURING MANNED SPACE FLIGHTS**

V. P. Bychkov *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 9-20 refs (See N67-39097 23-04)

In space missions with a duration up to 30 days the crew can use ordinary liquid, semisolid (or pureed), or solid foods. The expendables (oxygen, water, food) necessary for the life support system are stored aboard the spacecraft. During space flights of a longer duration the regeneration of water is anticipated. As a result, dehydrated foods should be taken along. In space missions of a far greater duration (over six months) the crew can be provided with food through its regeneration, storage of dehydrated products, or various combinations of the two methods. Author

**N67-39100** Joint Publications Research Service, Washington, D. C.

**ON THE PROBLEM OF PHARMACOLOGY IN SPACE MEDICINE**

V. Ye. Belay, P. V. Vasil'yev, and G. D. Glod *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 21-30 refs (See N67-39097 23-04)

On the basis of data in the literature and their own findings the authors discuss the application of pharmacology in space studies. The data on the effect of various pharmaceuticals (narcotic, analeptic, cardiovascular drugs) on the animal tolerance to prolonged transverse accelerations are presented. It was found that there is a changed reactivity of the human body to some drugs induced by long-term exposure to accelerations and changed atmospheric conditions. The main tasks and trends in the development of space pharmacology are reviewed. Author

**N67-39101** Joint Publications Research Service, Washington, D. C.

**ON THE MECHANISM OF THE DEVELOPMENT OF RESPONSES AND ADAPTATION TO HYPOXIA**

G. I. Gurvich and N. Z. Epshteyn *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 31-36 refs (See N67-39097 23-04)

The objective of this paper is a study of the mechanisms underlying the development of adaptation to oxygen deficiency in

animals. The reticular formation was investigated for this purpose. Experiments were carried out in three series. In the experiments of the first two series aminasine was used which produced a blocking effect on the reticular formation. The experiments performed on rats and rabbits showed that their resistance to oxygen starvation increased through adaptation to chronic hypoxia and decreased in comparison with the control. In the experiments of the third series the reticular formation of the paws and epidermis of the rats underwent an electrolytic destruction. This resulted in a better adaptation of the animals to prolonged hypoxia. The experimental data obtained in this way indicate that the reticular formation participates in the development of both response and adaptation to hypoxia. However, different parts of the reticular formation produce a different effect. Author

**N67-39102** Joint Publications Research Service, Washington, D. C.

**STUDY OF THE DEVELOPMENT OF CHLORELLA DURING SPACE FLIGHT**

V. A. Shevchenko, I. S. Sakovich, L. K. Meshcheryakova, and M. G. Petrovnnin *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 37-41 refs (See N67-39097 23-04)

This paper presents data on the viability and mutations of colonies of *Chlorella* detected after flight aboard the Kosmos 109 and Kosmos 110 satellites. The flight conditions produced no noticeable effect on the development of *Chlorella*. Author

**N67-39103** Joint Publications Research Service, Washington, D. C.

**SPERMATOGENESIS OF THE DOGS UGOLYOK AND VETEROK AFTER THEIR FLIGHT ON BOARD THE SATELLITE KOSMOS 110**

N. L. Fedorova *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 42-47 refs (See N67-39097 23-04)

A study was carried out to determine the state of spermatogenesis and reproductive ability of the dogs Ugolyok and Veterok after their 22-day flight on board the biological satellite Kosmos 110. The cumulative effect of space flight factors caused transient changes of the ejaculate. The animals produced a normal progeny, whose development is normal. Author

**N67-39104** Joint Publications Research Service, Washington, D. C.

**EFFECT OF EXTERORECEPTION ON THE MOTOR REACTION OF PIGEONS EXPOSED TO BRIEF WEIGHTLESSNESS**

Z. Novotny *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 48-55 refs (See N67-39097 23-04)

Twelve healthy pigeons were used in a study of the effect of increased and decreased exteroception on the reactivity of their motor analyzer. The experiments were carried out during brief weightlessness, visual orientation being retained or excluded. A similar study was made on eight labyrinthectomized birds. The test pigeons were placed in a vertically swinging cage. Its arrest in an upper position produced a brief decrease of gravity. The threshold of the motor reaction of the wings during weightlessness was determined. Author

**N67-39105** Joint Publications Research Service, Washington, D. C.

**DEPENDENCE OF ALTITUDE TOLERANCE OF ANIMALS ON THE STATE OF PHOSPHORYLATION PROCESSES**

T. A. Alilik and L. I. Karpova *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 56-58 refs (See N67-39097 23-04)

Experiments were carried out on rats to study the effect of hypokinesia on their oxygen consumption at rest, level of amylal-sensitive and amylal-resistant respiration in vivo, activity,

and altitude tolerance. The effect of a sodium amylal injection on the activity and altitude tolerance was investigated in rats exposed to 6-week hypokinesia and control animals. The exposure decreased oxygen consumption from  $159.0 \pm 6.7$  to  $94.4 \pm 23.3$  ml per 100 g of body weight per hour. The part of the amylal-sensitive respiration taken for phosphorylating respiration diminished from  $56.8 \pm 2.16\%$  to  $23.7 \pm 2.0\%$ . The activity and altitude tolerance fell in parallel with a decrease of the phosphorylating respiration. An amylal injection made 3-4 days before an exposure to extreme factors (maximum activity and acute hypoxia) elevated both the activity and altitude tolerance. The authors believe that maximum activity and altitude tolerance of an animal organism are in a direct relation to the power of enzymic systems of phosphorylating oxidation. Author

**N67-39106** Joint Publications Research Service, Washington, D. C.

#### MEASUREMENT OF TISSUE DOSES OF COSMIC RADIATION BY NUCLEAR EMULSIONS

K. S. Bogomolov, Ya. M. Veprik, M. Yu. Deberdeyev, Ye. Ye. Kovalev, E. G. Litvinova et al *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 59-65 refs (See N67-39097 23-04)

Methods for measuring the tissue dose of ionizing radiations with the aid of nuclear emulsions are discussed. Emulsions differing in their sensitivity, with different physical development techniques, were used. Measurements made aboard "Kosmos" satellites are described. Author

**N67-39107** Joint Publications Research Service, Washington, D. C.

#### NITROGEN METABOLISM IN ANIMALS EXPOSED TO HYPOKINESIA

I. V. Fedorov and L. A. Grishanina *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 66-72 refs (See N67-39097 23-04)

Changes of nitrogen metabolism were studied in rats exposed to experimental hypokinesia. Under these conditions the animals exhibited a sharp increase of total nitrogen, urea, creatinine, and phosphorus released with the urine, as well as a stable negative equilibrium of nitrogen. Author

**N67-39108** Joint Publications Research Service, Washington, D. C.

#### EXPERIMENTAL STUDY OF MASS METABOLISM IN CLOSED LIFE-SUPPORT SYSTEMS

A. P. Tereshchenko *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 73-79 refs (See N67-39097 23-04)

Peculiarities of the cycle of substances in life-support systems designed for long space flights are discussed. A method for its experimental study on the basis of mass and energy metabolism in system components is proposed. Author

**N67-39109** Joint Publications Research Service, Washington, D. C.

#### ON THE SENSOMOTOR COORDINATION OF MAN DURING WEIGHTLESSNESS

N. N. Gurovskiy and M. A. Cherepakhin *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 80-84 refs (See N67-39097 23-04)

This paper presents the results of a study of the motor coordination of man in a state of weightlessness. The study is concerned with two parameters: accuracy and duration of performance of motions. Short-term weightlessness (18 to 25 sec) was created during a jet flight in a Keplerian trajectory. The accuracy of movements and time spent in their performance were very similar during both the state of weightlessness and in horizontal flight. The differences noted were without statistical significance. Author

**N67-39110** Joint Publications Research Service, Washington, D. C.

#### POSITION OF PILOT'S HANDS AND FEET ON COCKPIT CONTROLS DURING LOSS OF CONSCIOUSNESS DURING SIMULATED FLIGHTS

J. J. Dvorak, V. V. Cerny, S. S. Cirek, B. F. Filsakova, B. I. Grubyseva et al *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 85-88 ref (See N67-39097 23-04)

Simulated flights of nine test subjects revealed that despite fainting caused by an acute hypoxia they correctly maintained altitude control in 92% of the cases, engine power control in 54% of the cases, and direction control in 60% of the cases. It appears that during an aircraft accident a pilot can keep his hands and feet on the cockpit controls despite fainting. Author

**N67-39111** Joint Publications Research Service, Washington, D. C.

#### THE SCANNING ACTIVITY OF A MAN OPERATOR EXPOSED TO SPACE FLIGHT FACTORS

Ye. S. Zav'yalov and S. G. Mel'nik *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 89-96 refs (See N67-39097 23-04)

A 10-day period of hypokinesia of a man operator resulted in a deterioration of his compensatory scanning. His control habits were restored by daily training by the third day after exposure to hypokinesia. The relationship between the control habits and the level of hypoxia and hypercapnia was determined. Scanning habits were significantly impaired when the man operator was exposed to an atmosphere containing 8.2% O<sub>2</sub>. Breathing air with a CO<sub>2</sub> content of 7.2-8.6% resulted in a transient deterioration of his scanning activity. At a CO<sub>2</sub> concentration of 9-9.2% the activity remained impaired throughout the hypercapnia effect. Author

**N67-39112** Joint Publications Research Service, Washington, D. C.

#### BRAIN HEMODYNAMICS DURING PROLONGED HYPOKINESIA

G. I. Gurvich and G. D. Yefimenko *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 97-102 (See N67-39097 23-04)

The rheoencephalographic technique was applied to a study of cerebral hemodynamics of four test subjects exposed to prolonged (up to 75 days) hypokinesia. Examinations were made prior to, during, and following the bed rest experiment. Observations also were made with the aid of orthostatic tests performed at the end of bed rest. The studies revealed a phasic pattern of changes of cerebral hemodynamics and their correlation with changes of higher nervous activity. In addition, the experiments revealed that the rheoencephalographic technique can be used for early diagnosis of intolerance to prolonged hypokinesia and precollapoid states during orthostatic tests. Author

**N67-39113** Joint Publications Research Service, Washington, D. C.

#### FUNCTIONAL STATE OF THE HUMAN AUDITORY ANALYZER IN AN EXPERIMENT WITH TWO-MONTH HYPOKINESIA

I. Ya. Vakovleva and E. I. Matsnev *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 104-110 refs (See N67-39097 23-04)

A study of the functional state of the human acoustic analyzer was carried out during a two-month exposure of test subjects to hypokinesia. The test subjects were six healthy men aged 22-36. The effect of hypokinesia was brought about by strict bed rest. The experiments revealed transient functional impairments of hearing which resulted in an increase of the thresholds from 15 to 34 db.

The changes may be attributed to disturbances of the central nervous system and circulation causing hemostasis in the inner ear.

Author

**N67-39114** Joint Publications Research Service, Washington, D. C.

**ON THE DIFFERENTIAL DIAGNOSIS OF SOMNOLENT AND PRECOLLAPOID STATES IN MAN**

O. P. Kozerenko and V. I. Myasnikov *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 111-120 refs (See N67-39097 23-04)

Experiments were carried out on healthy men to study somnolent and precollapoid (collapoid) states when falling asleep and during prolonged standing states. General regularities of the dynamics of the states indicated that they were intermediate processes (end functional effect, undulatory pattern of changes of physiological parameters, appearance of functional disturbances at different times). An electrophysiological analysis of the investigated processes demonstrated that the most informative symptom of the somnolent state was a change of the electroencephalographic frequency and amplitude and that of the precollapoid state was a cardiovascular change (pulse rate and arterial pressure). The problem is related to medical control of the health of a space crew.

Author

**N67-39115** Joint Publications Research Service, Washington, D. C.

**SOME INDICES OF THE HUMAN NATURAL RESISTANCE TO THE DIETARY REPLACEMENT OF ANIMAL PROTEIN BY CHLORELLA PROTEINS**

V. I. Fofanov, M. I. Kozar', and N. N. Dobronravova *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 121-127 refs (See N67-39097 23-04)

This paper presents the results of experiments carried out on five men aged 24-30 who for 30 days consumed a diet in which animal proteins were replaced by Chlorella proteins. The activity of lysozyme in the saliva and blood serum was studied. The titer of the complement and the serum bactericidal activity were investigated in relation to E. coli. The diet produced an inhibiting effect on the activity of lysozyme in the saliva and blood serum.

Author

**N67-39116** Joint Publications Research Service, Washington, D. C.

**APPLICATION OF THE MONOSYNAPTIC H-REFLEX IN RECORDING THE EFFECTS OF ELECTRICAL STIMULATION OF THE HUMAN VESTIBULAR APPARATUS**

Ya. M. Kots and V. A. Mart'yanov *In its Space Biol. and Med.*, Vol. 1, No. 3 22 Sep. 1967 p 128-135 refs (See N67-39097 23-04)

An evaluation of the reflex excitability of spinal motoneurons (H-reflex) was used in a quantitative control of the effect of electrical stimulation of the vestibular apparatus in man. An increase of the H-response amplitude of muscles of the calf was observed 20-30 msec following an application of a 1-msec vestibular stimulation. During the subsequent 60-70 msec the amplitude of the H-response grew in proportion to the force and duration of the stimulation. Ipsilateral effects of the vestibular stimulation revealed a lower threshold in comparison with contralateral ones.

Author

**N67-39136#** Kansas Univ., Lawrence.

**STUDIES RELATED TO AN EARLY DETECTION OF TOXIC EFFECTS OF ORGANIC CHEMICALS Final Report, Oct. 1965-31 Aug. 1967**

Harbans Lal 31 Aug. 1967 33 p refs  
(Contract N00014-66-C0006)  
(AD-657252)

Inhalation of methylchloroform containing air in a continuous flow inhalation chamber altered the pharmacological responsiveness of the exposed animal. It decreased the duration of hypnosis induced by hexobarbital or pentobarbital but did not affect the barbitol or chloralhydrate hypnosis. There was a significant increase in the hexobarbital oxidase activity of the liver microsomes but the microsomal nitro-reductase was not affected. The pharmacological as well as the biochemical changes were reversible. They were blocked by the pretreatment with ethionine. Intraperitoneal injections of methylchloroform produced effects which were opposite to those produced by its inhalation. The pentobarbital hypnosis was prolonged and the liver hexobarbital oxidase activity was depressed. It is concluded that methylchloroform produced specific changes in the drug metabolising enzyme systems. The nature of these changes were related to the route of administration of this agent.

Author (TAB)

**N67-39251\*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. DETERMINATION OF TERMINAL STERILIZATION PROCESS PARAMETERS**

J. A. Stern and A. R. Hoffman 1 Oct. 1967 13 p refs  
(Contract NAS7-100)

(NASA-CR-89233; JPL-TR-32-1191) CFSTI: HC \$3.00/MF \$0.65 CSCI 06T

The time/temperature effects on the reliability of spacecraft components and assemblies require that the terminal heat sterilizing process for spacecraft be adequate, but minimal. Accordingly, an analytical model was developed to study the effects of various facets of the terminal sterilization process and to establish the relationship which exists between the thermal characteristics of the spacecraft and microbial contamination. A simple geometrical configuration of the spacecraft was assumed. The effects upon the process parameters of times and temperatures of various heating and cooling rates were studied. In addition, various distributions of microbial load were postulated and the processes necessary to achieve sterility of the model spacecraft were determined. These variables, as well as the microbial heat-resistance parameters, are shown to affect significantly the derived process time at any temperature.

Author

**N67-39260#** School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.

**INCIDENCE OF EAR, NOSE, AND THROAT DISEASES IN 400 SPACE AND TEST PILOT CANDIDATES, 1 AUGUST 1963-1 AUGUST 1965**

William L. Mitchell, Morgan E. Wing, and Frederick G. Collins  
May 1967 22 p refs  
(SAM-TR-67-45; AD-657030)

The incidence of past and present ear, nose, and throat diseases derived from comprehensive evaluation of 400 space and test pilot candidates is reported. Comparisons are made between several items of past medical history, findings from physical examinations, and results of specialized examinations. The data presented provide useful information in the medical selection of space pilot candidates and an opportunity to study the results of longitudinal aeromedical screening. Additionally, the possible relationship between asymptomatic ear, nose and throat diseases in flying personnel and such factors as age, flying time, history, and results from examinations is discussed.

Author (TAB)

**N67-39316\*#** National Aeronautics and Space Administration, Washington, D. C.

**[PLANT AND ANIMAL LIFE SAFELY RECOVERED FROM BIOSATELLITE II]**

14 Sep. 1967 10 p

(NASA News Release-67-239) Available from the Clearinghouse for Scientific and Technical Information CSCI 06F

\* Findings from a preliminary analysis of Biosatellite II flight effects on a variety of plant and animal species are summarized in

a news release. Radiation effects on organisms under weightless conditions, particularly wheat seedlings and pepper plants, are cited. Brief accounts are given based on preliminary examination of Biosatellite II experimental data in following areas: amoeba, frog legs, adult vinegar gnats, vinegar gnat larvae, blue wild flowers, flour beetles, parasitic wasps, orange bread mold, and lysogenic bacteria.

E.C.

**N67-39317#** Japan Atomic Energy Research Inst., Ibaraki. Div. of Health Physics and Safety.

**ACTIVITIES IN THE DIVISION OF HEALTH PHYSICS AND SAFETY, APRIL 1, 1966-MARCH 31, 1967**

S. Sakagishi May 1967 181 p refs In JAPANESE; ENGLISH summary

(JAERI-5016) CFSTI: HC \$3.00/MF \$0.65

Construction progress and installation of reactor radioisotope facilities is reported. Annual statistics of exposure in existing facilities are given. The frequency of injury and damage to personnel; floor and air contamination; general safety techniques; reactor and laboratory monitoring; counting instrumentation; general administration; and facility maintenance, are discussed. L.S.

**N67-39320#** Cekmece Nuclear Research Center, Istanbul (Turkey). **CHANGES OF NATURALLY OCCURRING ZINC LOCATION DURING ITS GROWTH, DETECTED HISTOCHEMICALLY**

Emine Polar Jan. 1967 33 p refs

(CNAEM-42) CFSTI: HC \$3.00/MF \$0.65

This investigation was conducted to determine the relationship between zinc and growth of tissues and cells from the early stage of development up to maturation, as well as the probable relationship between zinc and cell division. The work deals with the distribution of dithizone detectable zinc in various cells and tissues of *Vicia faba* from its cotyledon before germination through all phases of its growth up to five internodes. The materials and methods used are described along with details of the observations and results.

R.N.A.

**N67-39349\*** Martin Co., Baltimore, Md.

**ANALYSIS OF CREW PERFORMANCE IN THE APOLLO COMMAND MODULE, PHASE I. VOLUME II: APPENDIX**

Jun. 1966 163 p

(Contract NAS9-5730)

(NASA-CR-65756; ER-14264, Vol. II) CSCL 05H

This appendix to the Apollo crew performance analysis contains a crew checklist of various activities to be performed during the Apollo mission, an etiology of crew errors, a pilot questionnaire on the relative difficulty of flight control tasks, tabulated data on crew flight control performance during mission time intervals, a duty cycle table, and graphs on pilot errors during duty cycles along with biomedical data.

R.N.A.

**N67-39356\*** Martin Co., Baltimore, Md. Man-Machine Engineering Dept.

**ANALYSIS OF CREW PERFORMANCE IN THE APOLLO COMMAND MODULE, PHASE I**

Milton A. Grodsky, David L. Glazer, and Albert R. Hopkins, Jr. Jun. 1966 163 p refs

(Contract NAS9-5730)

(NASA-CR-65755; ER-14264, Phase I) CSCL 05H

Studies were performed to determine the existence of any relationship between pilot performance and certain mission and equipment design variables identifiable in the Apollo command module. The data were obtained during simulated seven-day lunar landing simulations. Fifteen test pilots participated in the simulated missions and were organized into five three-man crews. Each flight control, switching, and guidance and navigation error was analyzed as to its nature, magnitude, direction, and etiology. The

particular mission effects investigated, using a variety of statistical techniques, were: systems and phase effects, phase by system interaction effects, display/control configuration effects, effects on pilot reaction time, mission time, and duty cycle effects. Results indicated that a high level of performance was achieved and, for the most part, maintained throughout the simulated mission. Certain isolated effects were demonstrated such as an observed increase in switching performance variability over mission-time; however, few consistent trends were developed.

Author

**N67-39361\*#** General Electric Co., Philadelphia, Pa. Missile and Space Div.

**A STUDY OF THE COLLECTION AND PRESERVATION OF BIOLOGICAL SPECIMENS DURING SPACE FLIGHT FOR POST-FLIGHT ANALYSIS Final Report**

[1967] 219 p refs

(Contract NASw-1562)

(NASA-CR-89336) CFSTI: HC \$3.00/MF \$0.65 CSCL 06C

Safety and measurement criteria for biological sampling are discussed; and analytical methods employed in blood, urine, and feces and sweat investigations are presented along with a bibliography for each of the categories and a correlation of analytical methods for constituents common to blood and urine. Sampling sites and methods; gas chromatography, mass and infrared spectroscopy, fluorescent antibody technique, and modified conventional analytical techniques; and media and preservation of samples for postflight analysis are considered. Details are included for chemical, refrigeration, freezing, vacuum distillation, adsorption and ion exchange, and lyophilization preservation techniques; and biological aspects of preserving blood, urine, feces and sweat are treated. Collection and handling procedures, the sampling regimen, and the training program are described.

M.W.R.

**N67-39409#** Army Edgewood Arsenal, Md. Medical Research Lab.

**THE SUBHUMAN PRIMATE: A GUIDE FOR THE VETERINARIAN**

Robert A. Whitney, Jr., Donald J. Johnson, and William C. Cole Jun. 1967 107 p refs

(EASP-100-26; AD-657570)

The regulations and standards of the Laboratory Animal Welfare Act, PL 89-544, require programs of disease control and prevention, euthanasia, and adequate veterinary care maintained under the supervision of a Doctor of Veterinary Medicine in research facilities that use subhuman primates, as well as dogs and cats. This guide is an attempt to provide the veterinarian with a broad familiarity with procurement, housing and care, techniques, nutrition, infectious diseases, and classification of subhuman primates and to provide references for more detailed requirements in specific areas.

Author (TAB)

**N67-39420#** Nagasaki Univ. (Japan). School of Medicine.

**BIO-INFORMATION PROCESSINGS OF THE ELECTROENCEPHALOGRAPHIC MASSPOTENTIALS IN ANIMAL AND MAN Final Report, 5 May 1966-4 May 1967**

Kensuke Sato Jul. 1967 89 p refs

(Contract DA-92-557-FEC-39566)

(J-267-2; AD-658170)

Bio-information processings of the brain masspotentials of man, monkey, cat and rabbit, which were recorded on magnetic tapes, were carried out through General Purpose Digital Computers. Evidences were found to suggest that man and animal brains operate their bio-information processing through normal Gaussian stochastic processes, at least for the first approximation. Late responses in the visual evoked potential of cerebral cortex of man, monkey, cat and rabbit were also manifested as related to stages of background EEG activities shown in their autocorrelograms. It was found that peak latencies of later responses of cerebral palsy

children were reduced compared with those of normal children, and those of later oscillatory potentials of rabbit also abbreviated progressively with lowering background EEG activities, though those of initial oscillatory potentials were elongated more and more. The former evidences may suggest impaired negative feed back action, such as recurrent inhibition. Alpha, beta, theta and delta waves in EEG were simulated by repetitive summation of an evoked potential elicited by a single flash stimulus with the same repetitive frequencies as each of the above EEG waves. This finding suggests that the EEG generating mechanism would be a masspotential due to changes in membrane potentials of cerebral neurone aggregates elicited by enumerable afferent trains of impulses.

Author (TAB)

**N67-39484#** Weizmann Inst. of Science, Rehovoth (Israel).

**WATER INSOLUBLE DERIVATIVES OF PROTEINS WITH BIOLOGICAL ACTIVITY** Technical Report, 1 Jul. 1966-30 Jun. 1967

Ephraim Katchalski 30 Jun. 1967 20 p refs

(Grant AF-EOAR-67-14)

(AFOSR-67-2025; AD-657797)

A number of derivatives of papain and chymotrypsin were prepared in which the active enzyme was covalently bound to a high-molecular weight carrier (e.g., poly-L-ornithyl papain, poly-L-glutamyl chymotrypsin). A kinetic study was made of these compounds, with particular attention given to pH activity profiles. Papain-collodion membranes were also prepared and were examined with respect to the effect of local gradients of enzyme and substrate on their kinetic activity.

TAB

**N67-39509\*#** Northeastern Univ., Boston, Mass. Electronics Research Lab.

**A STUDY OF MICROMINIATURIZED DEVICES FOR BIOASTRONAUTICAL MONITORING OR ANALYSIS** Semiannual Report

Basil L. Cochran and J. Spencer Rochefort 1 Sep. 1967 21 p refs

(Grant NGR-22-011-024)

(NASA-CR-89631; SAR-1) CFSTI: HC \$3.00/MF \$0.65 CSCL 06B

A literature survey and instrumentation evaluation was conducted to determine feasibility of developing an improved, lightweight apparatus for measuring hemoglobin in the ear with non-invasive instruments. Problems associated with obtaining ear measurements are discussed. Laboratory techniques for transmission measurement of blood parameters are reviewed and analytic expressions are developed. Two commercial instruments for laboratory measurement of the percent of oxyhemoglobin present in whole blood and a commercial ear oximeter were evaluated. The advantages of solid state light sources over incandescent sources in monitoring devices are examined. The use of microminiaturized integrated circuit technology to develop a modular electrode buffer amplifier is considered.

E.C.

**N67-39514#** Defence Research Board, Ottawa (Ontario).

**SPECIES-CHARACTERISTICS OF THERMOGENESIS FOLLOWING HYPOTHERMIA IN RODENTS**

L. A. Isaakian, D. A. Rozhaiya, and L. S. Maslennikova May 1967 9 p refs Transl. into ENGLISH from Zh. Evolyutsionnoi Biokhim i Fiziol. (Moscow), v. 1, no. 5, 1965 p 419-424

(DRB-T-471-4)

The thermogenetic capacities of certain rodent species during the process of rewarming after hypothermia induced in rats, mice, and hamsters are examined. The dynamics of restoration of heat production and body temperature at the 23°C environmental temperature immediately after cooling to a body temperature of 16-20°C is illustrated. It is shown that the highest level of oxygen consumption per kg of weight appears in the mice, and the lowest in the rats. Species characteristics are demonstrated in this case

and in the case of oxygen consumption in rats and hamsters of the same weight, both in the hypothermal state and in the normal thermal state. In the normal state the gaseous metabolism of hamsters was at a 20% higher level than in the rats; whereas the maximum level of metabolism in the hamsters during hypothermia was 42% higher than in the rats. In the species studied the spontaneous reanimation capacities differed, though they were determined by the temperature of the environment in which the emergence from hypothermia took place, and by the depth of hypothermia. The characteristic species-differences exhibited in recovery from the hypothermal state were undoubtedly related to species-differences of the thermogenetic mechanisms.

S.P.

**N67-39518#** RAND Corp., Santa Monica, Calif.

**LIFE IN THE UNIVERSE**

S. H. Dole Sep. 1967 21 p Presented at Hawthorne School, Beverly Hills, Calif., 28 Jul. 1967

(P-3669; AD-658009)

If life will appear whenever the conditions are tolerable, as stated by many modern scientists, and if there are numerous planets in the right mass range orbiting at the proper distance around suitable stars, then life must be quite common. Assuming here that the word life, wherever it appears, implies life based on water and on carbon compounds, that is, life as-we-know-it and as found on the surface of the earth. There are some very good arguments in support of this. Another argument depends on the very unusual properties of water and of the compounds of carbon. Water is an amazing material--there is no other compound that comes close to it in many of its properties. Similarly, no other element but carbon has the property of being able to form such an enormous variety of complicated long-chain compounds--as are demanded by life processes. Something like half-a-million compounds of carbon have been identified--which is perhaps 50 times as many as all the chemical compounds that do not contain carbon.

TAB

**N67-39546#** School of Aerospace Medicine, Brooks AFB, Tex.

**DETERMINATIONS OF ACHROMATIC VISUAL THRESHOLDS IN MAN FOLLOWING EXPOSURE TO ULTRASHORT, ULTRAVIOLET AND ROENTGEN WAVES [OB IZMERENII PEROGOV AKHROMATICHESKOGO ZRENIYA CHELOVEKA PRI DEISTVII ULTRAKOROTKIKH, ULTRAFIOLETOVYKH I RENTGENOVYKH VOLN]**

K. Kh. Kekcheev [1967] 7 p Transl. into ENGLISH from the publ. "Problemy Fiziologicheskoi Optiki" Moscow, Acad. Nauk SSSR, v. 1, 1941 p 77

(SAM-TT-R-880-0367; TT-60-13098; AD-653949) CFSTI: HC \$3.00/MF \$0.65

A series of experiments was carried out using short electromagnetic waves, exposing wrists to small amounts of X-rays (30-100 r). It is known that erythema usually appears on the sixth day after a dose of 600 r. However, changes in the visual threshold were noted one day after exposure to doses that were 6 to 20 times smaller (100-30 r) than the dose causing erythema. These changes were observed for several days. During the 'blind tests' all conditions were the same with one exception: a thick lead shield was placed between the patient and the source of radiation. In this manner, X-ray wave lengths from  $1 \times 10^{-7}$  to  $1 \times 10^{-8}$  cm (millimicrons and tenths of millimicrons) have, in either case, an effect on the autonomic nervous system. The experiments were continued using long electromagnetic waves rather than those of the visible spectrum. The experiment consisted of 47 tests on seven subjects. Control experiments (heat applied on abdomen and back) showed no changes. Ultrashort waves showed a marked effect on the visual threshold within a few hours. Separate tests were carried out also with short waves (length of waves approximately 50 meters) with equally valuable results. The experiments indicate that the autonomic nervous system of man is effected by a very large spread of electromagnetic wave lengths.

TAB

**N67-39549#** Rutgers Univ., New Brunswick, N. J. Douglass Coll.

**CONCEPTUAL STRUCTURE AND INTERPERSONAL ATTRACTION**

Siegfried Streufert, Carl Castore, Susan Kliger, and Michael J. Driver (Purdue Univ.) Aug. 1967 29 p refs  
(Contract N00014-67-0115-0002)  
(TR-4; AD-657942)

The social choices of subjects differing in complexity of conceptual structure were obtained for a number of hypothetical situations: (1) at a party, (2) under the leadership of... (3) leading, (4) in an academic task. Choices for each condition were factor analyzed. It was found that structural complexity accounts for one quarter to one third of the variance in social choices and that factor defined groups for each condition differ in complexity. It was further found that structurally complex persons generally make more choices than structurally simple persons. Further, the results serve to refute the position of Calhoun that patterns of interpersonal choice are due to random mathematical order. Author (TAB)

**N67-39572#** Saint Mary's Hospital, San Francisco, Calif. Dept. of Medical Education.

**PHYSICAL FITNESS AND HUMAN TOLERANCE TO ACUTE EXPOSURE TO LIFE AT HIGH ALTITUDE. EXPERIMENTAL DESIGN AND DATA PROCESSING METHODOLOGY FOR CLINICAL PHYSIOLOGICAL OBSERVATIONS** Progress Report

Cutting B. Favour 1967 35 p refs  
(Contract DA-49-193-MX-3059)  
(PR-1967-1; AD-658185)

A description is given of the methods by which measurements of various physiologic changes during exposure to altitude were collected. The type of log books which were kept are described in detail. The data processing system had five stages: (1) Chronological logging of raw data in separate log books; (2) preparation of edited input data sheets and data cards; (3) Computer output and human editing of data output cards; (4) Computer output and human editing of summary output cards; (5) computer output and final human interpretation of P and F values for significance of the results obtained. TAB

**N67-39611#** Naval Air Development, Johnsville, Pa. Aerospace Medical Research Dept.

**EVALUATION OF A WET SUIT IN CONJUNCTION WITH ANTI-BLACKOUT PROTECTION**

Robert M. Patton 3 Aug. 1967 14 p  
(NADC-MR-6713; AD-658508)

An investigation was undertaken to test and evaluate a wet suit worn in conjunction with the Mark II anti-G suit under acceleration. Eight subjects were run on the centrifuge under conditions of no protection, wearing an anti-G suit only, wearing an anti-G suit under the wet suit, and wearing the anti-G suit over the wet suit. Results indicated that acceleration tolerance was significantly improved by the use of the anti-G suit, but there was no statistically reliable difference between the anti-G suit only and the two anti-G suit/wet suit combinations. Author (TAB)

**N67-39631#** Washington Univ., Seattle.  
**ON THE "JUST NOTICEABLE DEPARTURE" OF DATA FROM THEORY**

John van Laer 15 Jul. 1967 13 p refs  
(Contract DA-49-193-MD-2713)  
(PRP-36A; AD-657934)

A lower bound on the noncentrality parameter of the chi-square test of goodness of fit is derived. The bound is a function of the average of absolute discrepancies between theoretical and true probabilities. This bound provides a method that estimates the correspondence between theory and data, and that nullifies, in part, Grants strictures against traditional goodness-of-fit tests. The

method also serves as a guide to planning an empirical evaluation of a quantitative theoretical model, when a chi-square test of goodness of fit is contemplated. Author (TAB)

**N67-39647\*** California Univ., Los Angeles. School of Medicine.  
**KIDNEY PARENCHYMAL OXYGEN TENSION DETERMINED BY RENAL LYMPH CANNULATION**

A. T. K. Cockett, A. P. Roberts, and R. S. Moore [1966] 11 p refs  
(Grants NsG-237-62; PHS HE-09834-02)  
(NASA-CR-89647) CSCL 06C

The results of kidney oxygen tension measurements by renal lymph cannulation in dogs showed that renal capsular lymph has a higher oxygen tension than hilar lymph. These findings support the present concept of plasma skimming with separation of intrarenal blood flow. The kidney cells are dependent on an oxygen gradient involving partial pressures of dissolved gases diffusing between plasma and the interstitial compartment. Intracellular oxidative metabolism is another factor to be considered in oxygen diffusion into lymph. Oxygen tension in the cisterna chyli lymph system was not significantly lower than renal hilar lymph. Thoracic duct lymph oxygen tension was significantly lower than the cisterna chyli fluid. R.N.A.

**N67-39650#** Michigan State Univ., East Lansing. Dept. of Biophysics.

**THE SEMICONDUCTIVE PROPERTIES OF LIPIDS AND THEIR RELATION TO THE ELECTRICAL CONDUCTIVITY OF LIPID BILAYERS**

Gordon Lee Jendrasiak Aug. 1967 132 p refs  
(Contract Nonr-2587(06))  
(TR-1; AD-657954)

A study was made showing that lipid films in the dry state behave as electrical semiconductors with high activation energies. For phospholipids, these activation energies range from 4.8 to 6.3 e.v. Upon hydration, the activation energies decrease whereas the conductivities increase. An effect parallel to that of water is found with exposure of lipids to iodine vapor; here the activation energies range from 2.7 to 3.2 e.v. With the adsorption of either water or iodine, the dielectric constant, frequency dispersion and dissipation factor of the lipids increased over the dry state values. Lipid bilayers were found to exhibit an increase of 1000 to 100000 in their electrical conductivity with exposure of the bilayer to iodine solution. Spectroscopic evidence was obtained indicating that lipids form charge-transfer complexes with iodine. This charge transfer evidence is taken as suggestive of a possible electronic conduction mechanism, not only in the lipid films, but also in the lipid bilayers. TAB

**N67-39676#** Naval School of Aviation Medicine, Pensacola, Fla.  
**RELATIONS BETWEEN VESTIBULAR NYSTAGMUS AND VISUAL PERFORMANCE**

Fred E. Guedry, Jr. 24 May 1967 28 p refs Prepared jointly with Army Aeromed. Res. Unit  
(NAMI-1008; AD-657847)

Relationships between vestibular nystagmus and visual acuity were measured during application of different magnitude vestibular stimuli which interfered with voluntary efforts to see visual detail in controlled illumination. Significant relations were found among vestibular stimulus magnitude, nystagmus, and visual acuity. During illumination, nystagmus growth and decay curves depart markedly from curves found in darkness and from theoretical expectations. Steps in nystagmus slow phase velocity appear to be related to steplike shifts in visual acuity while steps in nystagmus amplitude seem to signify the point of surrender of voluntary efforts to maintain clear vision. Step-changes in nystagmus may explain the physiological third stage of spin reported in jet aircraft. Individual differences in Dynamic Visual Acuity-Vestibular are discussed in

relation to Dynamic Visual Acuity and also in relation to flight safety.  
Author (TAB)

**N67-39680#** Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.  
**LUNG CHANGES RESULTING FROM PROLONGED EXPOSURE TO 100% OXYGEN AT 550 MM HG**  
George H. Kydd 17 May 1967 31 p refs  
(NADC-MR-6710; AD-658720)

Rats exposed to 100% oxygen at 500 mm Hg for 30 days survive and show no respiratory or other difficulty during the exposure. Histological examination of the lung tissue indicates that the blood vessels of the lung have undergone a change in structure during the exposure. The results suggest that the media is eroded as evidenced by thin vessel walls and by streaming of the media into the adventitia. There is also evidence of hypertrophy and/or hyperplasia in the vessel walls.  
Author (TAB)

**N67-39688#** Saint Mary's Hospital, San Francisco, Calif.  
**PHYSICAL FITNESS AND HUMAN TOLERANCE TO ACUTE EXPOSURE TO LIFE AT HIGH ALTITUDE. EFFECT ON HEMATOCRIT AND HEMOGLOBIN VALUES OF VARIATIONS IN THE STATE OF PHYSICAL ACTIVITY, PHYSICAL CONDITION AND ALTITUDE**  
Cutting B. Favour, John A. Faulkner (Mich. Univ., Ann Arbor), and James Kolias (Pa. State Univ.) Mar. 1967 20 p refs  
(Contract DA-49-193-MX-3059)  
(PR-1967-4; AD-658169)

Attention was focused on three variables: (1) The role of exercise in raising the hematocrit; (2) the role of physical fitness in preserving a degree of homeostasis close to an hematocrit level of 40 which is the viscosity and cell concentration for optimal oxygen flow to the tissue; and (3) the role of changing altitudes as an independent variable which change is associated with a rise in hematocrit and hemoglobin both at rest and during exercise and more so in the sedentary than in the fit subject. The data suggest that the peripheral venous blood hematocrit and hemoglobin levels are lower in athletes than they are in sedentary or fit subjects. Exposing athletes to high altitude apparently does not raise these lower hematocrit and hemoglobin levels as much as this exposure does in healthy normal subjects. This phenomenon can be interpreted to be evidence for a physiological cross-adaptation between high degrees of physical fitness and speed of acclimatization to high altitude.  
Author (TAB)

**N67-39702#** Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.  
**THE EFFECT OF WATER IMMERSION AND BODY POSITION UPON PERCEPTION OF THE GRAVITATIONAL VERTICAL**

John G. Nelson 18 Jul. 1967 27 p refs  
(NADC-MR-6709; Rept.-10; AD-658507)

The purpose of this study was to measure the accuracy, particularly the sensitivity or short-term repeatability, with which humans can use their vestibular sense to perceive the gravitational vertical, and how this ability varies with body (head) position. Equipment and procedures to reduce or eliminate nonvestibular cues were selected through iterative process of design, development, test, and evaluation. Ss were restrained upon an underwater 2-axis tilt table, and required to position themselves, via signals to Es, in one of 6 cardinal positions of the body (head) with respect to gravity. Seven Ss, in 3 immersions each, made 3 judgements per immersion at each of the 6 positions. The group responses showed some large and significant constant error, most notably a pitch-forward bias shared (unequally) by all of the medial-plane positions, exceeding 30 degrees in the nominal head-down position. A Probable Error, (PE), uninflated by constant errors, was computed for each of the 2 orthogonal directions of deviation for each of the 6 positions. The results supported the classical concept of

reduced sensitivity in the head-down as compared with the head-up positions. However, PE ranged from 15 degrees to 40 degrees, indicating only a marginally useful sensitivity in any position. In addition, sensitivity at any one position was not necessarily symmetrical as to direction of deviation, and some sensitivities at intermediate values of tilt overlapped head-up or head-down sensitivities.  
Author (TAB)

**N67-39724#** Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.  
**DEVELOPMENT OF TECHNIQUES FOR EVALUATING THE PHYSIOLOGICAL PROTECTIVE EFFICIENCY OF CIVIL AVIATION OXYGEN EQUIPMENT**  
Ernest B. McFadden Apr. 1967 17 p refs  
(AM-67-3)

The two alternative methods of determining mask performance based on gas analysis and blood oxygen saturation were used simultaneously in this study for comparison. Evaluation of newly developed crew oxygen masks was divided into three phases. The first phase consisted of exposing the subjects to a stepwise flight profile with a maximum altitude of 43,000 feet while wearing the mask. The second phase consisted of rapidly decompressing the subjects from 8,000 to 40,000 feet in 45-50 seconds while wearing the mask. The third phase consisted of rapidly decompressing these subjects from 8,000 to 40,000 feet with delayed donning of the mask during the decompression. Instrumentation of subjects provided for simultaneous determination of seven physiological parameters during decompression which are compared and discussed. Results of these experiments indicate that, insofar as design standards are concerned, the present criteria based on inspired oxygen partial pressure are satisfactory, but should be supplemented by determination of blood oxygen saturation during chamber evaluations.  
Author

**N67-39753\*#** National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.  
**DEVELOPMENT OF RESPIRATION-RATE TRANSDUCERS FOR AIRCRAFT ENVIRONMENTS**  
Robert T. McDonald (Northrop Corp., Anaheim, Calif.) and James Roman Washington, NASA, Oct. 1967 17 p refs  
(NASA-TN-D-4217) CFSTI: HC \$3.00/MF \$0.65 CSCL 06B

Two types of sensors for monitoring respiration rate in aircraft environments have been developed: a low pressure pneumotachometer designed to monitor the pilot's respiration rate in aircraft that have low pressure breathing-oxygen supply, and a high pressure pneumotachometer designed to monitor the pilot's respiration rate in aircraft with a high pressure breathing-oxygen supply. For both pneumotachometers, the sensor is placed in series with the oxygen supply line and the pilot's oxygen line. The sensor detects gas flow that accompanies inspiration. The pneumotachometers were tested in the laboratory and in high performance aircraft. The sensors are sensitive to gas flow and can detect a shallow breath. Each of the sensors requires very low power consumption and is thus suited for use with internally powered tape recorders.  
Author

**N67-39776\*#** Naval School of Aviation Medicine, Pensacola, Fla.  
**VESTIBULAR REACTIONS IN CAT AND MAN DURING AND AFTER ANGULAR ACCELERATIONS. II: RESPONSES TO LATERAL CANAL STIMULI OF VARIOUS ACCELERATIONS**  
Fred E. Guedry, Jr., and William E. Collins Jun. 1967 15 p refs  
(NASA Order R-93)  
(NASA-CR-89670; NAMI-1012) CFSTI: HC \$3.00/MF \$0.65 CSCL 06P

A direct relationship between duration of acceleration and decline of response during acceleration, rate of decline of response after acceleration, and magnitude of secondary reaction is regarded

as an indication of a central process which limits a prolonged vestibular primary reaction. The process is manifested by its influence on relatively basic reflex reactions (nystagmus) in the cat, and is more prominently manifested in man by its influence on sensory perception.

Author

**N67-39777\*#** Naval School of Aviation Medicine, Pensacola, Fla.  
**VESTIBULAR REACTIONS IN CAT AND MAN DURING AND AFTER ANGULAR ACCELERATION. 1: RESPONSES FROM THE LATERAL AND THE VERTICAL CANALS TO TWO STIMULUS DURATIONS**

William E. Collins and Fred E. Guedry, Jr. Jun. 1967 19 p refs

(NASA Order R-93)

(NASA-CR-89669; NAMI-1011) CFSTI: HC \$3.00/MF \$0.65 CSCL 06P

Ocular nystagmus was recorded in darkness from cat and man during 4-deg/sec<sup>2</sup> accelerations about an Earth-vertical axis. Lateral-canal stimulation yielded greater primary and secondary nystagmus than did vertical-canal stimulation. In cat, both lateral- and vertical-canal responses to a 36-second stimuli peaked after 15-21 seconds of angular acceleration, and this was followed by a steady decline. Declines during acceleration were not apparent in nystagmus of man. There was a more consistent secondary nystagmus in cat than in man. In cat, primary after-nystagmus was greater following an 8.4-second stimulus than following a 36-second stimulus. In man, a like difference occurred in the sensation but was not present in nystagmus. In this regard, nystagmus from cat resembled the subjective reactions of man more than they did the nystagmus of man.

Author

**N67-39794#** Northrop Space Labs., Hawthorne, Calif.  
**PRESSURE SEALING CLOSURES FOR FULL PRESSURE PROTECTIVE SUIT ASSEMBLIES** Final Report, 15 Jul. 1966-10 Feb. 1967

Roger M. Heitz and Gary G. Brown Wright-Patterson AFB, Ohio, AMRL, Jun. 1967 52 p refs

(Contract AF 33(615)-5372)

(AMRL-TR-67-59; AD-658204)

Longitudinal and circular pressure sealing closures were designed and developed for full pressure protective assemblies from a design concept provided by the Aerospace Medical Research Laboratories, invention disclosure number 66/588. This study consisted of (1) designing pressure closure devices, (2) selecting suitable materials for the fabrication of the sealing closure parts and the cylinders to include the closures, (3) selecting an appropriate fabrication process for the closure sealing parts, and (4) fabricating and testing the breadboard and demonstration models containing either the circular or longitudinal closures. An EPDM elastomeric material was found to be suitable for the fabrication of the closure sealing parts which were molded using an established molding technique. The fabricated breadboard and demonstration models passed successfully the required tests wherein leak rates were determined from 0 to 5 psig, and exposure to pressure up to 12 psig, were performed.

Author (TAB)

**N67-39795#** Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.

**INTERAURAL INTENSITY DIFFERENCE LIMEN**

Roy C. Rowland, Jr. and Jerry V. Tobias May 1967 14 p refs

(AM-67-10) CFSTI: HC \$3.00/MF \$0.65

The ability to judge the direction (the azimuth) of a sound source and to discriminate it from others is often essential to flyers. A major factor in the judgment process is the interaural intensity difference that the pilot can perceive. Three kinds of intensity-difference thresholds were compared for the purpose of determining interaural-binaural and interaural-monaural relations. Five subjects were tested at 250, 2000, and 6000 Hz, using a variation of the Bekesy technique. Responses to 27 interaural intensity combinations were measured at each frequency. Monaural and

binaural conditions were included. Each of 24 of the combinations was measured under 0° and 180° interaural phase conditions, and all were measured at 50, 35, and 20 dB HL (ISO). Results indicate that interaural-difference thresholds decrease as a function of level, as might be predicted. These thresholds vary as a function of the frequency and apparent azimuth of the fused tone, but are relatively insensitive to variations in interaural phase. Interaural intensity-difference thresholds differ significantly from both monaural and binaural difference thresholds.

Author

**N67-39854#** California Univ., Livermore. Lawrence Radiation Lab.

**SOLUTION DENSITIES OF SODIUM CHLORIDE AS A FUNCTION OF TEMPERATURE AND ANHYDROUS SALT CONTENT**

William L. Robison and Michael J. P. Weston 4 May 1967 107 p ref

(UCRL-50256) CFSTI: HC \$3.00/MF \$0.65

The International Critical Tables give the solution densities of sodium chloride as a function of anhydrous salt content at intervals of 2% and as a function of temperature at intervals of 10°C. A Lagrange polynomial generalized for two variables and requiring a double interpolation was used in conjunction with the data from these tables to generate tables with 0.1% intervals (from 1.00 to 20.90%) for anhydrous salt content and 0.1°C (from 0 to 36.3°C) for temperature. The density range is from  $\rho = 1.00047$  to  $\rho = 1.16405$ .

Author (NSA)

**N67-39864#** Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.

**PERFORMANCE CHARACTERISTICS OF CONSTANT-FLOW PHASE DILUTION OXYGEN MASK DESIGNS FOR GENERAL AVIATION**

Ernest B. McFadden, Hiley F. Harrison, and James M. Simpson May 1967 15 p refs

(AM-67-9) CFSTI: HC \$3.00/MF \$0.65

This report describes evaluation of two prototype phase dilution rebreathing masks as compared to an open port rebreathing mask design. Human subjects wearing the prototype masks and engaged in three minute periods of rest and exercise were exposed to altitudes of 14,000, 18,000, 25,000, 30,000 and 34,000 feet in an altitude chamber. Each subject was instrumented to obtain a variety of physiological parameters including end expiratory gas composition, blood oxygen saturation, ECG, and respiratory rate. Oxygen flow and system pressure as provided by an automatic constant-flow regulator were also determined. With the same oxygen flow rates the prototype porous and dilution valve masks provided higher tracheal oxygen partial pressures than the open port masks at all altitudes tested during rest and exercise.

Author

**N67-39865#** Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.

**A FUNCTIONAL COMPARISON OF BASIC RESTRAINT SYSTEMS**

Joseph W. Young Jun. 1967 17 p

(AM-67-13) CFSTI: HC \$3.00/MF \$0.65

The problem of body restraint during accident event is pursued by this study. Since the greatest frequency of serious injuries occurs from upper body components (head, neck and chest) impacting or being penetrated by rigid, uneven surfaces, it is desirable and essential to restrain the body and prevent interaction with the surrounding structures. The functional characteristics of eight complete (seat belt and shoulder harness) restraint systems and a typical incomplete (seat belt only) system are presented graphically for comparison in a series of figures based on kinematic head patterns. An additional series compares the relative differences in restraining qualities that result from varying the attachment locations of an incomplete (seat belt only) system.

Author

**N67-39867#** Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.

**DIAGNOSTIC TESTS OF COLOR DEFECTIVE VISION Annotated Bibliography, 1956-1966**

Mark F. Lewis and Faye K. Ashby May 1967 15 p refs  
(AM-67-8) CFSTI: HC \$3.00/MF \$0.65

An annotated bibliography of 83 recent papers on diagnostic tests for color vision defects is presented. Three of the foreign-language articles have been translated. Procedures for obtaining copies of the translations are included. Author

**N67-39869\*#** Franklin Inst., Philadelphia, Pa. Research Labs.  
[RESEARCH IN LIFE SCIENCES INSTRUMENTATION PERTINENT TO STUDIES IN SPACE BIOLOGY] Quarterly Report, 1 Jul.-30 Sep. 1967

R. M. Goodman 30 Sep. 1967 8 p  
(Contract NSR-39-005-018)  
(NASA-CR-89600; Q-B2299) CFSTI: HC \$3.00/MF \$0.65 CSCL 06B

The first brain probe assembly was evaluated with respect to sterilizability and configuration and found to be satisfactory. All probes are now complete and coated with silastic using stannous octoate as the catalyst. The electronic system was frozen and is well into fabrication. Multichannel telemetry efforts were concerned with an investigation of a new modulator. Current drains on the order of  $9 \times 10^{-6}$  amperes are obtainable and frequency sensitivities on the order of 1 to 2% per millivolt seem realizable. Study has continued on the design of means to obtain both uniform fields above ambient earth's field and shielding to obtain fields very much below the earth's field. In this respect, previous papers are being re-examined which are concerned with applying computer techniques to produce tables from which shields could be easily designed and with the use of Helmholtz or Helmholtz type coils to produce accurate and uniform fields. R.N.A.

**N67-39886#** Honeywell, Inc., St. Paul, Minn. Systems and Research Center.

**AUTOMATIC TEMPERATURE CONTROL FOR LIQUID-COOLED FLIGHT SUITS Final Report, Jun. 1966-May 1967**

Glen L. Merrill and James B. Starr Johnsville, Pa., Naval Air Develop. Center, 3 Aug. 1967 83 p refs.  
(Contract N156-48547)  
(Rept.-12045-FR1; NADC-AC-6702; AD-655834)

An automatic control system for maintaining constancy of skin temperature ( $T_{sub s}$ ) has been shown to be feasible by using special sensors to detect changes in  $T_{sub s}$  and proportional fluid amplifiers to regulate the temperature of water flowing through the tubing of a water-cooled undergarment. Tests have indicated the response of the system when  $T_{sub s}$  increased due to exercise or to an external heat load. Author (TAB)

**N67-39898\*#** University of Southern Calif., Los Angeles. Dept. of Electrical Engineering.

**SYNTHESIS AND IDENTIFICATION OF MATHEMATICAL MODELS FOR THE DISCRETE CONTROL BEHAVIOR OF HUMAN OPERATORS**

M. J. Merritt May 1967 201 p refs  
(Grant NGR-05-018-022)  
(NASA-CR-89634; USCEE-202) CFSTI: HC \$3.00/MF \$0.65 CSCL 05H

This report describes the synthesis and identification of mathematical models which characterize the discrete control behavior of human operators. This type of behavior occurs in control situations where the human operator must decide between a small number of alternatives, while generating continuous control actions at the same time. In this report a systematic treatment of discrete control actions is made possible by the use of two types of hybrid elements. One accepts continuous inputs and produces binary outputs, while the other has continuous inputs and produces continuous outputs under the control of binary signals. Decisions to

initiate an action, throw a switch, or select which switch out of a group of switches should be operated are described by a Multi-State Decision Element (MSDE). Decisions concerning the magnitude of a discrete control action, the length of a control interval, etc. are modeled by a Proportional Decision Element (PDE). Procedures and digital computer programs for the complete identification of both types of elements are given. The two elements are applied to the modeling of human operators performing compensatory tracking of gaussian random inputs. Two experiments were performed. Author

**N67-39929#** Public Health Service, Washington, D. C. National Center for Air Pollution Control.

**AIR QUALITY CRITERIA FOR SULFUR OXIDES**

Mar. 1967 226 p refs  
(PHS-Publ.-1619) GPO: \$1.25

Sulfur dioxide and sulfur trioxide are easily formed during the combustion of sulfur in fossil fuels. About 25 to 30 parts of sulfur dioxide to each part of sulfur trioxide are formed. The other sulfur oxides are either difficult to form or are unstable so that they are not significant air pollutants. Sulfur dioxide is a relatively stable, non-flammable, non-explosive colorless gas that most people can detect at concentrations from 0.3 to 1 ppm in air. Sulfur dioxide can act as either a reducing agent or as an oxidizing agent, and it can react with materials in the air to form sulfur trioxide, sulfuric acid, and sulfate salts. It is highly soluble in water with which it reacts to form sulfurous acid. Sulfur trioxide reacts very rapidly with water to form sulfuric acid, its normal form in the atmosphere. Author

**N67-39930\*#** Scientific Translation Service, La Canada, Calif.  
**THE EFFECTS OF ACCELERATED CENTRIFUGAL FORCE UPON THE DEVELOPMENT OF THE FROG EMBRYO. MORPHOLOGICAL CHANGES IN FROG EMBRYOS CENTRIFUGED IN VARIOUS DEVELOPMENTAL PHASES [DIE GESTALTUNGSVORGANGE DER IN VERSCHIEDENEN ENTWICKLUNGSTADIEN ZENTRIFUGIERTER FROSCH-KEIME]**

B. Konopacka Washington, NASA, Oct. 1967 38 p refs  
Transl. into ENGLISH from Polska Akad. Umiejtnosci, Rozprawy Wyzszo Mat. Przyrod. (Krakow), 1908 p 689-741)  
(Contract NASw-1496)  
(NASA-TT-F-11317) CFSTI: HC \$3.00/MF \$0.65 CSCL 06F

Experiments by the author on the effect of gravitational force on the development of frog eggs are compared with those of Pflüger conducted in 1883-84 and others. The author investigates the differential effects of centrifugal acceleration applied during various well-defined phases of early development of frog eggs and the consequences of these effects upon the further course of the development. Eggs of *Rana fusca* were artificially fertilized in glass dishes. The eggs were subjected to a wide range of acceleration and temperature. Author

**N67-39961** Joint Publications Research Service, Washington, D. C.

**EFFECT OF IONIZING RADIATION ON CONDITIONED REFLEX ACTION**

O. Ye. Voyevodina 24 Oct. 1967 23 p refs Transl. into ENGLISH from the book "Otdalennyye Rezul'taty Vozdeystviya Luchey Rentgena Na Vysshuyu Nervnuyu Deyatel'nost' Sobak" Leningrad, Med. Publ. House, 1967  
(JPRS-43077; TT-67-33702) CFSTI: \$3.00

The effect of different doses of X-rays on the complex motor-food conditioned reflexes in dogs formed by the Kupalov method of situation conditioned reflexes was investigated. The study established that the greater the complexity of the motor activity conditioned reflex developed in the animals, the more rapid is its disturbance under the influence of X-rays, and the greater is the

delay of its resititution to its normal level. The conditioned motor activity reflex in the animals when restored to its normal level can again be disturbed even one to five years after the irradiation under the influence of different physiological and pharmacological factors. The offspring of females irradiated with doses of 200 to 300 rads show a prolonged decline in the work capacity of the central nervous system including the cerebrum. Different histological deviation from the norm are also noted in the cerebrum of these dogs.

R.N.A.

**N67-39963\*** California Univ., Berkeley.

**WORKSHOP CONFERENCE ON SPACE RADIATION BIOLOGY Final Report**

Sep. 1965 30 p Conf. held in Berkeley, Calif., 7-10 Sep. 1965; sponsored by NASA

(NASA-CR-89581) CFSTI: HC\$3.00/MF\$0.65 CSCL 06R

The papers presented at a conference on space radiation and its biological effects are summarized. The topics of the papers included radiological physics, heavy ion effects on mammalian systems, space radiation hazards to man, molecular effects, an evaluation of the combined effects of radiation and other stresses in space flight, and cellular effects.

R.N.A.

**N67-39978\*** Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

**STUDIES OF MULTIVARIABLE MANUAL CONTROL SYSTEMS: TWO-AXIS COMPENSATORY SYSTEMS WITH SEPARATED DISPLAYS AND CONTROLS**

William H. Levison and Jerome I. Elkind Washington, NASA, Oct. 1967 131 p refs

(Contract NAS2-3080)

(NASA-CR-875: Rept.-1459) CFSTI: HC \$3.00/MF \$0.65 CSCL 05H

A series of two-variable manual tracking experiments was performed in which subjects were required to view two separated displays and operate two control devices to control the system. Performance was measured as a function of the display separation, the forcing function bandwidth, the task difficulty and the controlled-element dynamics. Human controller describing functions, eye movement distributions, and normalized mean-squared tracking error were obtained. Measurements were obtained when a single variable was viewed foveally, when a single variable was viewed peripherally, and when both variables were controlled simultaneously. The primary difference between the 1-axis foveal, 1-axis peripheral, and 2-axis human controller describing functions in all experiments was a difference in the low-frequency gain. These gain differences were generally consistent with the NMSE differences.

Author

**N67-39984\*** Army Medical Research Lab., Fort Knox, Ky. Biophysics Div.

**SURFACE TEMPERATURE AS A PARAMETER IN ESTIMATING LASER INJURY THRESHOLDS Interim Report**

George R. Peacock 8 Jun. 1967 26 p refs

(AMRL-733; AD-658967)

A simple model based on elevation of the surface temperature in biological tissue was formulated in an attempt to aid in estimating laser injury thresholds. The model shows reasonable agreement in the ranges where experimental data are available. This fact lends confidence to predictions of injury thresholds for other laser wavelengths and pulse length. Predictions are made in particular for eye injury in the visible and near infrared, for tissue burns in the mid- and far-infrared.

Author (TAB)

**N67-39985\*** Army Medical Research Lab., Fort Knox, Ky. Experimental Psychology Div.

**THE SCALING OF EFFORT PRODUCED BY STRENUOUS ISOMETRIC MUSCLE CONTRACTIONS Progress Report**

Lee S. Caldwell 8 Sep. 1967 6 p refs

(AMRL-749; AD-658979)

Thirty-five Ss were required to maintain manual loads equal to 30%, 40%, 50%, 60%, 70%, and 80% of their maximum strength as long as possible and to report the intensity of the effort required by the task on a five-point scale. With each increase in load, endurance was reduced and effort developed at an increased rate, showing that effort rating was sensitive to variations in contraction strength. External occlusion of the blood supply to the contracting muscles, especially at the lighter loads, also produced briefer maximum contraction times and accelerated the reports of the various levels of effort. The contraction strength at which the internal pressure in the muscle effectively occluded the blood supply was found to be between 60% and 70% of maximum strength. The data were transformed to eliminate differences in endurance produced by the various experimental conditions by expressing the time of appearance of each level of effort as a percentage of the time at which maximum effort was reported for that condition. When this was done, it was found that effort was a linear function of the percentage maximum contraction time.

Author (TAB)

**N67-40006\*** Scientific Translation Service, La Canada, Calif.

**REGULARITY IN THE CORRELATION BETWEEN THE TRUE URINE REACTION AND THE ALVEOLAR CO<sub>2</sub> TENSION [UEBER GESETZMAESSIGKEITEN IN DER BEZIEHUNG ZWISCHEN DER WAHREN HARNREAKTION UND DER ALVEOLAREN CO<sub>2</sub>-SPANNUNG]**

Gustav Endres Washington, NASA, Oct. 1967 21 p refs Transl. into ENGLISH from Biochem. Z. (Heidelberg), v. 132, no. 1/3, 1922 p 220-241

(Contract NASw-1496)

(NASA-TT-F-11293) CSCL 06P

Fluctuations in hydrogen ion concentration in urine were studied and correlated with CO<sub>2</sub> tension in the arterial blood. The effect of various diets was investigated. The interpretation of post digestive fluctuations in urine acidity of K.A. Hassebalch is refuted. The effect of morphium, coffein, muscle work and other factors is investigated.

Author

**N67-40010\*** National Aeronautics and Space Administration, Washington, D. C.

**POSITIONAL RELATION OF SPERMIIUM POINT OF ENTRY TO THE MEDIAN PLANE AND TO THE PRIMITIVE GROOVE AFTER LOCAL VITAL STAINING TESTS WITH THE AXOLOTL OVUM [DIE LAGEBEZIEHUNG DER SPERMIIUMEINTRITTSSTELLE ZUR MEDIANEBENE UND ZUR ERSTEN FURCHE NACH VERSUCHEN MIT OERTLICHER VITALFAERBUNG AM AXOLOTL]**

H. von Eggeling Oct. 1967 11 p refs Transl. into ENGLISH from Anat. Anz. (Jena) v. 63, 1967 p 198-209

(NASA-TT-F-11356) CSCL 06C

Experiments for determining the position of the spermium entry point in relation to the median plane and to the primitive groove, using local vital staining with agaragar as color base and using Axolotl ova, are discussed. The method is presented as more accurate and simple than previous ligation and other methods. Results indicate that a dorsoventral differentiation presumably exists already in the unfertilized ovum. Penetration of the spermatozoon, under assumption of a primary bilateral structure, occurs between production of the ovum symmetry and formation of the primitive furrow. Entry point of the spermium has no distinct relation to the ovum symmetry and the grooving pattern frequently follows the fertilization meridian in that the primitive groove coincides with this meridian independent of the ovum symmetry.

Author

**N67-40020\*** Army Medical Research Lab., Fort Knox, Ky. Experimental Psychology Div.

**CROSS-MODALITY ESTIMATION OF ANGULAR VELOCITY Interim Report**

James H. Brown 26 Jun. 1967 13 p refs  
(AMRL-738; AD-658657)

The exponent of 1.0 found previously for numerical magnitude estimates of angular velocity during passive rotation was validated by auditory cross-modality estimates. Acceleration intensities ranged from 3 degrees/sec sq to 24 degrees/sec sq, with durations varying from 10 sec. to 80 sec. It was concluded that adaptation evident in responses to the longer duration stimuli is a real phenomenon and of potential significance as one form of disorientation. Author (TAB)

**N67-40078#** Massachusetts General Hospital, Boston. Stanley Cobb Labs. for Psychiatric Research.

**RESEARCH ON INFORMATION PROCESSING IN THE CENTRAL NERVOUS SYSTEM Final Report, 1 Feb. 1962-31 Jan. 1966**

Frank R. Ervin Bedford, Mass., AFRL, Aug. 1967 108 p refs  
(Contract AF 19(628)-408)  
(AFRL-67-0145; AD-658494)

An on-line computer controlled visual stimulation and computation of the post stimulus time histogram of single neurons in cat visual cortex was carried out. Three-hundred fifty cells are described as to temporal firing pattern and field response curves. In addition, the effects of background illumination and reticular formation stimulation were studied in a smaller number. These two variables were effective in modifying field response patterns primarily by modifying basal firing levels and excitability. The use of single spot stimulation suggests the existence of a receptive field which would show unique sensitivity to (simple) geometric form or motion without the convergent coding at the geniculate suggested in the literature. In addition, these fields prove to be capable of modulation by changing circumstance. This view of the structure of the visual cortex of the mammal necessitates some revision of simplistic models which have been advanced for hardware realization of pattern-recognizing artifacts. Author (TAB)

**N67-40080#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

**VISION IN SPACE TRAVEL**

V. Popov and N. Boyko Redstone Arsenal, Ala., Redstone Sci. Inform. Center, 9 Aug. 1967 13 p Transl. into ENGLISH from Aviat. i Kosmonavt. (Moscow), no. 3, 1967 p 73-76 Prepared jointly with Army Missile Command  
(NASA-TM X-60574; RSIC-698) CFSTI: HC \$3.00/MF \$0.65 CSCL 05H

Laboratory experiment results and Voskhod flight data are compared in an attempt to assess the effect of supersonic and space travel conditions on the functional abilities of pilots and astronauts to detect light signals and to identify different types of visible shapes. Tests included measurements of vision sharpness, vision efficiency, perception characteristics of colors of objects, and observations of the earth's surface. It was found that the level of functional stability of chromatic vision is substantially affected by a series of conditions such as color, adaptation, simultaneous and subsequent contrast, and comparison features. Definite changes are also found in the functional abilities. The point is made that the peculiar behavior of human vision in space must be considered in instrument design and in astronaut training programs. M.G.J.

**N67-40091#** New Mexico State Univ., Las Cruces.  
**MICROORGANISMS COLONIZING STRAWS BURIED IN CHILE DESERT SOIL SAMPLES**

Eugene E. Staffeldt 25 Sep. 1967 12 p refs  
(Contract JPL-951602)

(NASA-CR-89594) CFSTI: HC \$3.00/MF \$0.65 CSCL 06M

Sterilized plant parts were buried in three Chile Atacama Desert soil samples. These organic traps were removed from the soil samples, washed free of adhering soil particles, and plated onto the surface of agar contained in petri dishes. Two genera of

fungi and four bacteria were isolated from the organic traps. Dilution techniques yielded information different from that obtained from the trap burial technique. Author

**N67-40096#** Michigan Univ., Ann Arbor.

**MEASURING HUMAN PERFORMANCE WITH A PARAMETER TRACKING VERSION OF THE CROSSOVER MODEL**

Glenn A. Jackson Washington, NASA, Oct. 1967 253 p refs  
(Contract NASr-54(06))  
(NASA-CR-910) CFSTI: HC \$3.00/MF \$0.65 CSCL 05H

A continuous parameter tracking system is developed using an approximate version of the crossover model as the basic system model. The parameter tracking system is designed to adjust automatically the gain and time-dealy parameters so that the instantaneous value of the square of the error between the model output and the compensatory system output is driven toward zero. The parameter tracking system is tested on subjects controlling single and double integrator plants, with input signals of bandwidth limited Gaussian noise. The gain and time-delay parameters are found to change significantly with training and with the bandwidth of the input signal. The parameters also vary between subjects and with the order of the plant being controlled. A theoretical analysis of the system shows that the convergence properties of the parameters can be calculated when the input signal is sinusoidal and the system is tracking a known constant coefficient system. Author

**N67-40136#** Allied Research Associates, Inc., Concord, Mass.  
**REVIEW OF BIOLOGICAL MECHANISMS FOR APPLICATION TO INSTRUMENT DESIGN, VOLUME V**

J. Healer, ed. Aug. 1967 97 p refs  
(Contracts NASw-1515; NASr-16; NASw-535, NASw-1228)  
(NASA CR-89601; ARA-346-F-2, Vol. V, Pt. 1) CFSTI: HC \$3.00/MF \$0.65 CSCL 06D

The results are summarized of a review of biological photoreception, mechanoreception, chemoreception, and electrosensing mechanisms for application to instrument design and engineering. Structural, functional, and operational principles of various classes and types of biosensors as they occur throughout the animal phyla are analyzed and the principles are evaluated from a bionic viewpoint against a background of current and anticipated instrumentation requirements and techniques. R.N.A.

**N67-40155\*** National Aeronautics and Space Administration. Washington, D. C.

**DEPTH PERCEPTION AND HEAD MOVEMENTS**

Ye. M. Belostotskiy Nov. 1967 7 p Transl. into ENGLISH from Probl. Fiziol. Optiki SSSR, v. 8, 1953 p 341-345  
(NASA-TT-F-11360) CSCL 05J

Details are presented on experiments to investigate the dependency of depth perception on binocular and monocular vision and to determine the temporal features of depth perception combined with collateral stimuli. Two black needles with variable position were observed against a uniform white background in a depth ophthalmometric apparatus, with one and two eyes, with and without head motion. Head motion was found to have the greatest effect on depth perception and on the time threshold. A noise factor also had a marked influence on the time threshold. It was determined that the usual distinction between binocular and monocular types of depth perception is incorrect. N.E.N.

**N67-40159\*** National Aeronautics and Space Administration, Washington, D. C.

**CHANGES IN THE BONES OF THE EXTREMITIES AS A RESULT OF THE PROLONGED AND COMBINED INFLUENCE OF LOW TEMPERATURE AND HUMIDITY [IZMENENIYA V KOSTYAKH KONECHNOSTEY PRI DLITEL'NOM SOCHETANNOM VOZDEYSTVII NIZKOY TEMPERATURY I VLAZHNOY SREDY]**

G. A. Orlov and K. M. Gavrilova. Nov. 1967 9 p refs Transl. into ENGLISH from Klinich. Med. (Moscow), v. 43, Nov. 1965 p 15-19

(NASA-TT-F-11351) CSCL 06C

The extremities of 45 mice and 12 rats were cooled in water of 7-12° for 6 to 12 hours over a period of 2 to 7 days. Upon histological examination, the following changes were revealed: the development of edema in the soft tissues; the appearance of infiltrates and thromboses, periostitis, and reorganization of the lamellar structure of the bone. An X-ray investigation of the bones of the extremities was carried out in 67 patients whose occupations involved repeated cooling in water. In 65 cases, the following changes were found in the bone tissues: reorganization of the spongy substance of the bone tissue of digital phalanges, bones of the feet and hands, the development of cysts, foci of osteosclerosis, periostitis, and moderately manifested deforming arthrosis.

Author

**N67-40172#** Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.

**TECHNIQUES OF PURIFICATION OF FERRITIN AND CONJUGATION WITH ANTIBODIES FOR THE LABELING OF SPECIFIC PROTEINS UNDER THE ELECTRON MICROSCOPE [TECNICHE DI PURIFICAZIONE DELLA FERRITINA E CONJUGAZIONE CON ANTICORPI PER LA VISUALIZZAZIONE AL MICROSCOPIO ELETTRONICO DI PROTEINE SPECIFICHE]**

K. Hsu 8 Mar. 1967 33 p In ITALIAN; ENGLISH summary (ISS-67/8) CFSTI: HC\$3.00/MF\$0.65

The experiments hereby reported deal with the labeling of globulin with fluorescein and/or ferritin. All the techniques of purification of ferritin and globulin and of conjugation with ferritin and fluorescein are described in details together with an application at the electron microscope.

Author

**N67-40184\*** Farnham (Frank C.) Co., Philadelphia, Pa.  
**PROTEINS (ANTIBODIES) WHICH REACT SPECIFICALLY WITH DNA DAMAGED BY ULTRAVIOLET RADIATION [BELKI (ANTITELA), SPESIFICHESKI REAGIRUYUSHCHIYE S DNK, POVRZHDENNOY DEYSTVIEM UL'TRAIOLETOV-OGO IZLUCHENIYA]**

V. K. Podgorodnichenko and A. M. Poverenny Washington, NASA, Nov. 1967 9 p refs Transl. into ENGLISH from Molekul. Biol., Akad. Nauk SSSR, Inst. Radiats. i Fiz. Khim. Biol. (Moscow), v. 1, no. 4, 1967 p 483-487

(Contract NASw-1497)

(NASA-TT-F-11340) CFSTI: HC\$3.00/MF\$0.65 CSCL 06C

Antibodies which react with UV-irradiated DNA ( $3 \times 10^{-5}$ - $10^{-6}$  erg/mm<sup>2</sup>; 254 mμ) were produced in rabbits by immunization, as described by Plescia, Braun and Palczuk. These sera did not react directly with native, denatured, single-strand DNA nor with UV-irradiated RNA. Antibodies induced by UV-irradiated DNA (dose rate,  $10^6$  erg/mm<sup>2</sup>) began to react with DNA exposed to UV at a dose rate of  $3 \times 10^5$  erg/mm<sup>2</sup>.

Author

**N67-40220\*** National Aeronautics and Space Administration, Washington, D. C.

**INVESTIGATIONS OF THE INFLUENCE OF HEAVY MUSCULAR WORK ON RENAL CAPACITY [UNTERSUCHUNGEN UEBER DEN EINFLUSS SCHWERER MUSKELARBEIT AUF DIE NIERENLEISTUNG]**

Th. Benzinger Oct. 1967 7 p refs Transl. into ENGLISH from Arbeitsphysiol. (USSR), v. 8, 1935 p 142-146 (NASA-TT-F-11290) CFSTI: \$3.00 CSCL 06S

Investigations on the influence of heavy muscular work on renal function, using the blood-urea clearance method, are discussed briefly with a tabulation of results obtained on 10 healthy test subjects during rest and heavy muscular work. Muscular work greatly influenced the urea clearance and caused a drop in renal function by as much as 25-75%. Water excretion, presumably by extrarenal processes, is influenced to a greater and more lasting extent than the urea excretion function. It is suggested to make urea clearance tests for diagnostic purposes only at bed rest.

Author

**N67-40236\*** Allied Research Associates, Inc., Concord, Mass.

**BIBLIOGRAPHY ON BIOSENSORS. A SAMPLING OF THE WORLD LITERATURE 1960-1966, VOLUME V**

J. Healer Aug. 1967 321 p

(Contract NASw-15115)

(NASA-CR-89616; ARPA-346-F-2, Vol. V, Pt. 2) CFSTI: \$3.00 CSCL 06B

Biosensor phenomenology is stressed in a bibliography based on a sampling of the world literature between 1960 and 1966 that is referenced according to the categories of (1) mechanoreceptors, (2) photoreceptors, (3) chemoreceptors, (4) thermoreceptors, (5) electric and magnetic field sensors, (6) general sensor information, (7) neural aspects of sensor function, and (8) miscellaneous. Journal code translations and a user's guide are included in this bibliography which lists authors, titles, and sources of document.

M.W.R.

**N67-40237\*** Oregon State Univ., Corvallis.

**SYSTEMATIC DESCRIPTION AND KEY TO ISOLANTS FROM HAWAIIAN SOILS Progress Report**

W. B. Bollen and Karen M. Byers 20 Sep. 1967 55 p Prepared for JPL

(Contracts NAS7-100; JPL-950783)

(NASA-CR-89680) CSCL 06M

A systematic description is presented of isolants from the Hawaiian soils. A dichotomous key separates the individual isolants into groups; the descriptive charts are arranged in these groups. In addition to this dichotomous key is a list of the isolants and species designations in the order of the code numbers. Of the 43 isolants from the Hawaiian soils, 65.1% are bacteria, 27.9% are actinomycetes, and 7.0% are molds. Isolants numbering 33Ab, 34Bc, and 37Bd contained more than one type of bacterial culture. The 37Bd is the only one needing further separation. Of the surviving isolants that are bacteria, 80.8% belong to the genera *Bacillus* and 19.2% belong to the "soil diphtheroid" group of organisms.

Author

**N67-40239#** Illinois Univ., Urbana. Group Effectiveness Research Lab.

**MULTIMODE FACTOR ANALYSIS OF INTERPERSONAL PERCEPTIONS**

Earl E. Davis and Nadine Natker Grobstein Dec. 1966 47 p refs

(Contract Nonr-1834(36); ARPA Order 454)

(TR-36; AD-658515)

Data resulting from the interpersonal perceptions of 88 students who were heterogeneous with respect to race and sex were subjected to a variety of analyses, including Tuckers three-mode factor analysis procedure. Ss responded on Semantic and Behavioral Differential scales to complex person stimuli designated in terms of race, sex, and other characteristics which formed a factorial design. The data were reduced to a two-way classification of scales-by-stimuli, using Ss mean group responses, and conventional factor analyses of scales were performed. Analyses of variance were carried out to determine the relative weights of the stimulus

factors in determining the responses of the various groups of Ss on the scale factors. Finally, the three modes of the data classified in terms of scales-by-stimuli by subjects were subjected to Tuckers three-mode factor analysis. After obtaining principal axis factors for the three modes, the scale and subject mode factors were rotated by Varimax and the stimulus mode factors were transformed by means of discriminant function analysis. Counter-rotations of the three modes yielded a core matrix linking the scale factors to the stimulus factors. Although not all of the subject types were clearly interpretable in the present study, this type of analysis, with some modifications, would appear to have great potential value in treating complex interpersonal perception data. Author (TAB)

**N67-40256\*** Honeywell, Inc., Minneapolis, Minn. Systems and Research Center.

**RESEARCH ON COMPUTATIONAL AND DISPLAY REQUIREMENTS FOR HUMAN CONTROL OF SPACE VEHICLE BOOSTERS. PART I: THEORY AND RESULTS**

Final Report, 1 Mar.-31 Aug. 1967

J. D. Gilchrist and P. A. Anderson Aug. 1967 135 p refs

(Contract NAS8 20023)

(NASA-CR-89606; Rept.-12513-FR3-I, Pt. I) CFSTI: HC \$3.00/MF \$0.65 CSCL 05H

The purpose of this study was to develop minimum computational and display requirements which will allow the full utilization of a human pilot's capabilities to perform the boost guidance function during the ascent phase in an efficient and near-optimal manner. In this volume, a three-dimensional Earth model for the Reusable Orbital Transport (ROT) vehicle was simulated. The Nominal Guidance Scheme was used for the first-stage guidance, the Predictive Model Guidance Scheme (PMGS) for the second stage guidance. The mathematical model used for the real time simulation of the ROT vehicle is discussed, and the equations of motion, written in a wind axis coordinate system assuming a spherical rotating Earth, are presented. Also included are the target orbit, guidance plane geometry, and the equations of motion for the fast time model required in the PMGS. Results of the operator work load measurement and display format evaluation are given in addition to computational and display requirements. K.W.

**N67-40267\*** National Aeronautics and Space Administration, Washington, D. C.

**MEDICAL BENEFITS FROM SPACE RESEARCH**

[1967] 19 p

(NASA-EP-46) GPO: \$0.20 CSCL 06E

Described and pictured are a number of devices and techniques which resulted from research discoveries and engineering innovations of the space program. Application of these benefits toward the advancement of medicine is shown. The functions of NASA's Office of Technology Utilization are briefly discussed. K.W.

**N67-40284#** Library of Congress, Washington, D. C. Aerospace Technology Div.

**SPACE BIOLOGY AND MEDICINE: A NEW SOVIET JOURNAL, SPECIAL REPORT Surveys of Foreign Scientific and Technical Literature**

Daniel M. Pyle 22 Nov. 1967 61 p refs

(ATD-67-37)

Abstracted data are presented on reports of original research and review papers dealing with problem areas in the field of bioastronautics. The topics covered include problems in selecting scientist cosmonauts, using spacecraft computers for medical purposes, creating life support systems for spacecraft, and human acceleration tolerance; space psychology experiments; spaceflight gastroenterology; spacecraft habitability; radiation safety; anoxic radiation resistance in potato plants; cardiac reactions to hypoxia; preventing cardiovascular reactions to hypokinesia; hypodynamia

effect on protein synthesis; reflex hemodynamic regulation during acceleration; and vestibular stimulation effect on visual neurons. M.G.J.

**N67-40288#** Space-General Corp., Los Angeles, Calif.

**ELECTRICAL COUPLING AND NORMAL MODES OF OSCILLATION IN DENSE EXCITABLE CELLULAR STRUCTURES** First Status Report, 1 Apr.-1 Jul. 1967

Robert M. Stewart Aug. 1967 54 p refs

(Contract N00014-67-C-0361)

(SG-1198/SR-1; AD-659519)

An experimental study, largely using simple inorganic electrochemical models, of structural and electrical characteristics which lead, through the agency of electrical fields, to intercellular transmission of excitation or information and to intrinsic oscillations (both sub- and suprathreshold) in dense arrays of both biological neurones and neuron-like data-processing elements as now being developed. Such periodic phenomena are presumed to have both physiological and pathological significance in (normal and abnormal) brain function, but are, as yet, only little understood. Author (TAB)

**N67-40290** Joint Publications Research Service, Washington, D. C.

**BIOLOGICAL EFFECT OF THE COMBINED ACTION OF GAMMA RAYS AND SPACE FLIGHT FACTORS ON BARLEY SEEDS**

N. I. Nuzhdin and R. L. Dozortseva 27 Oct. 1967 23 p refs  
Transl. into ENGLISH from Zh. Obshch. Biol. (Moscow), v. 27, no. 4, 1967 p 397-412

(JPRS-43155; TT-67-33780) CFSTI: \$3.00

To assess the effect of space flight factors (SFF) on seed germination and frequency of chromosome aberrations, gamma irradiated and nonirradiated barley seeds in organic and forced dormancy were placed onboard the Voskhod I. Similar seeds served as the control. Some seeds were soaked in a cysteine solution before germination. The results showed that SFF undoubtedly produced genetic changes. The SFF were also found to (1) accelerate the emergence of the seeds from organic dormancy, differing in this respect from gamma irradiation; (2) have no effect on germination vigor or rate in seeds that were in a state of forced dormancy; (3) increase the number of aberrant cells, as compared with controls, in the primary rootlets of the seeds in forced dormancy, while having no effect on seeds in organic dormancy. Irradiation of seeds before and after spaceflight showed that gamma rays and SFF have an additive influence. Considered of fundamental importance to space biology was the finding that cysteine reduces the yield of aberrant cells induced by SFF. M.G.J.

**N67-40294\*** Swift and Co., Chicago, Ill. Research and Development Center.

**INTERIM REPORT FOR 12 MONTHS ENDING JULY 31, 1967**

Harland H. Young 31 Jul. 1967 34 p

(Contract NAS7-487)

(NASA-CR-89746) CSCL 06A

Protein films of various thicknesses were prepared, using a superclear gelatin with a natural pH of 3.9 to 4.1, deaminated gelatin, carbamidated gelatin, cyanamidated gelatin, and phenol-formaldehyde resin gelatine condensate. Plasticizers, made up as aqueous solutions and colored for easy identification, were used in the films at various levels. These included ethylene glycol, polyethylene glycol, dimethylsulfoxide, N-methylpyrrolidone, and glycerol. The basic formula is given, and the preferred method of casting a film is detailed. Film samples were tested for helium transmission and tensile strength, and the results are tabulated. Data points were used to estimate the effects of gelatins, plasticizers, levels of plasticizers, and film thicknesses on gas transmission.

Experimental data are also included on the use of crosslinking agents, which were added as 1.0% solutions to prevent premature gelatin. Consideration is also given to the use of reinforcing fibers, and the effects of ultraviolet irradiation, and heat and cryogenic temperature treatments on the films.

M.G.J.

**N67-40299#** Naval Medical Research Inst., Bethesda, Md.  
**A REACTION VESSEL FOR USE IN GAS CHROMATOGRAPHIC ANALYSIS OF AQUEOUS SOLUTIONS. APPLICATION FOR BLOOD CARBON MONOXIDE DETERMINATION**  
 Research Report

Frederick Lee Rodkey and Harold A. Collison 20 Mar. 1967  
 14 p refs

(Rept.-16; AD-659061)

A reaction vessel was designed and constructed for use in gas chromatographic analysis of gases liberated from aqueous solutions. The apparatus is a self contained attachment which replaces the standard gas sampling loop on the chromatograph. A single interchangeable glass tube with a ground glass joint is used and is convenient to prepare, clean and replace between analyses. Gas sweep-out characteristics of the vessel were tested with carbon monoxide liberated from a carboxyhemoglobin solution. A sweep-out period with the carrier gas of 1 to 3 minutes was shown to recover 99.4 to 99.7 per cent of the total CO originally present in the solution. The usefulness of the reaction vessel was demonstrated by the measurement of blood carbon monoxide content in a series of 74 hospital patients.

Author (TAB)

**N67-40317\*#** Biotechnology, Inc., Arlington, Va.  
**DEVELOPMENT OF AN IMPROVED PERCEPTUAL-MOTOR PERFORMANCE MEASUREMENT SYSTEM**

Raymond E. Reilly and James F. Parker, Jr. Aug. 1967 55 p  
 (Contract NASw-1329)

(NASA-CR-89613) CFSTI: HC \$3.00/MF \$0.65 CSCL 06B

This report describes the development and fabrication of three units of a perceptual-motor performance measurement system. The measurement system, consisting of a subject console and an experimenter console, is designed to measure 18 basic dimensions of human perceptual-motor performance. The present system represents an improved version of an earlier measurement console built under a prior NASA contract. Improvements are primarily in the areas of (1) separation of the subject and experimenter functions, thereby making the device more useful as an item of research equipment, (2) increased reliability during sustained operations, and (3) better design for maintainability.

Author

**N67-40329\*** National Aeronautics and Space Administration, Washington, D. C.

**MEASUREMENTS OF THE PROTON DOSE OF THE GEMINI ASTRONAUTS WITH NUCLEAR EMULSIONS [MESSUNGEN DER PROTONENDOSIS DER GEMINI-ASTRONAUTEN MIT KERNEMULSIONEN]**

H. J. Schaefer Oct. 1967 14 p refs Transl. into ENGLISH from Biophysik (Berlin), v. 4, 1967 p 63-76

(NASA-TT-F-11237) CSCL 06R

Results of proton dose measurements with nuclear emulsions, during various Gemini flights, are discussed as to their transitory or permanent effect on the organism. Photomicrographs of Ilford G.5 and K.2 nuclear emulsions and plottings of range spectra of ending particles indicate that the radiation received by the astronauts during passage through the South Atlantic anomaly of the radiation belt was produced to 40% by protons of a range of less than 1 mm tissue. The total (skin) dose received during the 14-day Gemini flight was about 200 millirad, varying between 159 and 233 millirad for the three test points on the astronaut body and showing a decrease in depth. No reliable determination of the true radiation stress and of the maximum permissible dose for whole-body irradiations was possible, but even skin doses of

several 100 rad during passage through the center of the radiation belt would result in depth doses of not more than 10-20 rad.

Author

**N67-40339#** Aerospace Medical Div. Aerospace Medical Research Labs., (6570th), Wright-Patterson AFB, Ohio

**TWO-HANDED RETENTION ON VARIOUS HANDLE CONFIGURATIONS**

John W. Garrett, Milton Alexander, and William G. Bennett May 1967 23 p refs

(AMRL-TR-67-63; AD-658441)

Data are presented on the manual grip-retention capability of seated persons. Nine male subjects, grasping experimental ejection actuators located forward of an ejection seat pan, were required to maintain their grasp against force loadings of 50 to 500 pounds. Grip retention at various increments of time to a maximum of 30 seconds are compared for each of the four handles: a T-bar, Twin grips, a standard D-ring and a flexible Gemini-type loop. Test results indicated that the T-bar provides the greatest grip-retention capability. Potential applications of these performance data are discussed.

Author (TAB)

**N67-40344#** Cornell Aeronautical Lab., Inc., Buffalo, N. Y.  
**VISUAL ACUITY DURING VIBRATION AS A FUNCTION OF FREQUENCY, AMPLITUDE AND SUBJECT DISPLAY RELATIONSHIP** Final Report, Jul. 1965-Jun. 1966

L. Rubenstein and H. A. Taub Wright-Patterson AFB, Ohio, AMRL, Jun. 1967 25 p refs

(Contract AF 33(657)-11729)

(AMRL-TR-66-181; AD-658440)

Visual acuity during whole body Z-axis vibration (while in a semi-supine position) was measured as a function of frequency and amplitude of the input vibration, two restraint configurations (with or without a bite-bar), and two subject-display relationships (subject alone vibrating, and subject and display both vibrating). The results indicated an interaction between frequency of vibration and the restraint variable in their effects on visual acuity. Visual acuity suffered greater decrement with the bite-bar than without it, and the degree of this difference increased with increasing frequency. The effects of these variables were quite similar for both subject-display relationships. The report also describes the development of the method which was used to measure visual acuity. This is a vernier technique which makes use of a varying contrast ratio between the visual target and the background.

Author (TAB)

**N67-40350#** North American Aviation, Inc., Columbus, Ohio.  
**PROBABILITY INDEXES OF IMAGE INTERPRETER PERFORMANCE: DEVELOPMENT AND EVALUATION**

Girard W. Levy, Leonard A. Evans, John H. Humes, and Robert Sadacca (Army Behavioral Sci. Res. Lab.) Washington, Army Behavioral Sci. Res. Lab., Jun. 1967 88 p refs /ts Tech. Res. Note 183

(Contract DA-092-ARO-47)

(AD-658653)

The study was conducted in a two-phase project to explore the development of indexes predictive of interpretation results and the effect on performance of probabilistic feedback given interpreters while they are examining imagery. Statistical treatment and analysis of data, based on the judgment and performance of trained interpreters, is described in detail. The ten best predictors of accuracy of target identification and the eight best predictors of the value of continued search (search utility) were identified and their predictive validity assessed in a three-session experiment. The predictors contributing most to the validity for accuracy of performance were (1) judged target difficulty and (2) interpreters confidence in his identifications. Predictors of search utility were of generally low validity. More effective prediction was obtained for target identification than for target detection or classification. It was found that feedback of both accuracy and search utility

probability data reduced the number of incorrect identifications. Overall individual accuracy, completeness, or rate of interpretation was not affected, however, by feedback. Based on the findings in this study, it seems feasible that interpreters accuracy predictions can be substituted for confidence ratings now used as more precise indications of dependability of the information. Predictions have some utility also in weighting identifications made by several interpreters or in conjunction with relative estimated cost errors--omissions vs misidentifications--in selecting among response alternatives within an image interpretation facility. Author (TAB)

**N67-40357#** Tufts Univ., Boston, Mass. Inst. for Psychological Research.

**HUMAN FACTORS ENGINEERING BIBLIOGRAPHIC SERIES. VOLUME 3: 1965 LITERATURE**

Paul G. Ronco Aberdeen Proving Ground, Md., Human Eng. Labs., May 1967 543 p refs

(Contracts Nonr-494(13); DA-18-001-AMC-1004(X))

(AD-657590)

This bibliography is the third in a planned series of bibliographies of literature pertinent to the field of human factors engineering. It covers literature of 1965. This bibliography consists primarily of: (1) an index to the human factors literature, and (2) the annotated bibliography. TAB

**N67-40370#** Chicago Univ., Ill. Committee on Mathematical Biology.

**STATISTICAL MECHANICS OF NEURAL NETWORKS**

Jack D. Cowan [1967] 105 p refs

(Contract F61052-67-C-0061)

(AD-658886)

A mathematical model is developed of the activity of networks of model nerve-cells or neurons. A nonlinear delay operator is introduced to represent the transfer characteristics of neurons. This operator is a continuous function that represents the mean neuronal response to stimulating currents. The mathematics used is not the Boolean algebra of switching circuits, but Differential equations. The dynamics is examined of certain model brain circuits, some of which are shown to exhibit undamped responses to stimuli, but only for a few levels of activity. The techniques of Hamiltonian mechanics and of Gibbsian statistical mechanics are used to connect these models with experimental data. A preliminary explanation is given for the existence of preferred states found in the firing patterns of neurons in animal nervous systems. Author (TAB)

**N67-40406#** Franklin Inst., Philadelphia, Pa. Systems Science Dept.

**EXPERIMENTS IN DISPLAY EVALUATION**

Daniel Landis, Robert M. Slivka, James M. Jones, and Carl A. Silver Jul. 1967 89 p refs

(Contract Nonr-4832(00))

(TR-1-194; AD-658733)

Four experiments were performed with the following objectives: (1) further explore a proposed method of display evaluation; (2) relate the proposed method to conventional measures of display goodness; (3) examine the effects of three types of informational irrelevancy on decision adequacy, and (4) test a hypothesis relating to the effects of compressing discrete informational units onto single symbols. In all experiments except those related to objective 2, the subjects task was to make a military-type decision based on information presented on the display. Two decision-game formats were used; the first was logistical while the second used an air-reconnaissance situation. In these studies, each decision the subject made was associated with an explicit cost-payoff function. Since each problem required a series of such decisions, a weighted sum of the payoffs, minus the costs, was the method of display evaluation. Each of several display variables (such as density, use of color, or clutter), and response variables (such as search time)

was related to cost-payoff scores, depending on the experiment. Major conclusions were that the decision-quality metric is potentially useful for evaluating display systems, and that information-extraction measures apparently are unrelated to the metric. It was also revealed that the effectiveness of a display is positively related to the amount and randomness of irrelevant information presented in the display. Author (TAB)

**N67-40433\*#** Farnham (Frank C.) Co., Philadelphia, Pa.

**GENETIC STUDIES IN SPACE [GENETICHESKIYE ISSLEDOVANIYA V KOSMOSE]**

G. P. Parfenov Washington, NASA, Oct. 1967 20 p refs  
Transl. into ENGLISH from Kosmich. Issled. (Moscow), v. 5, no. 1, 1967 p 140-155

(Contract NASw-1497)

(NASA-TT-F-11251) CFSTI: HC \$3.00/MF \$0.65 CSCL 06F

Review of Soviet and foreign papers on genetic studies in space covering the period from the late twenties through 1965. Discussed specifically are the results of free-balloon, rocket, and satellite experiments with microorganisms, plants, and animals. A brief analysis of these results is given. Author

**N67-40458\*** Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn. Space and Life Systems Dept.

**STUDY TO RELATE APOLLO SPACE SUIT TECHNOLOGY TO THE FIELD OF HYPERBARIC MEDICAL THERAPY**

25 Mar. 1966 123 p

(Contract NASw-1271)

(NASA-CR-89671) CSCL 06B

Application of various NASA-sponsored space technologies to the field of hyperbaric medicine was studied. Considered were the needs of diving and aviation operations and hyperbaric medical facilities. Domestic and foreign chamber systems were studied, and two portable, collapsible hyperbaric chamber system concepts were designed for routine decompression and treatment of dysbarism associated with diving operations. The two concepts are: (1) a two-man, one-lock chamber incorporating foam-filled fiberglass sandwich and convoluted rubber-impregnated fabric construction; and (2) a two-man, two-lock chamber of fiberglass sandwich separable into two individual one-lock chambers without pressure loss. The two chamber designs also possess the capability for limited use in oxygen therapy of other pathology. Target engineering and medical specifications were compiled for the design and analysis work, and comparative weight studies using other materials as well as rigid and collapsible configurations were performed. Closed loop and open loop environmental control systems for these chambers were studied, and two respective approaches are proposed. The utilization of bio-instrumentation with these chambers was also investigated. It is concluded that a definite need exists for portable hyperbaric chamber systems with a two-man capability. K.W.

**N67-40465\*#** Scientific Translation Service, La Canada, Calif.

**THE EFFECT OF VIBRATION ON THE MORPHOLOGIC PATTERN OF ENDOCRINE GLANDS [WPLYW WIBRACJI NA MORFOLOGICZNY ORBAZ GRUCZOLOW DOKREWNYCH]**

Ryszard Piechocinski Washington, NASA, Oct. 1967 3 p refs  
Transl. into ENGLISH from Patol. Polska (Warsaw), v. 17, no. 4, 1966 p 561-563

(Contract NASw-1496)

(NASA-TT-F-11328) CFSTI: HC \$3.00/MF \$0.65 CSCL 06C

After vibration of frequency 1800/min and amplitude of 6 mm in the vertical and 4 mm in the horizontal direction, no changes were found in the thyroid gland or ovaries. The adrenal glands were enlarged, their medullary portion was hyperemic, and the zona fasciculata was slightly enlarged. The changes in the adrenal glands of white mice were attributed to stress connected with vibration. Author

**N67-40552\*** National Aeronautics and Space Administration, Washington, D. C.

**MECHANISM OF HEAT REGULATION [UEBER DEN MECHANISMUS DER WAERMEREGULATION]**

Sp. Dantas Oct. 1967 18 p refs Transl. into ENGLISH from Arch. Ges. Physiol. (Berlin), v. 241, 1939 p 612-629 (NASA-TT-F-11275) CSCL 06C

Older concepts on the mechanism of heat regulation, according to which fever produces a stimulation of the heat centers and antipyretics have a narcotic effect, is disproved on the basis of experiments on animals in which the polypnea threshold and the thermal width were determined. It is demonstrated that fever produces a paralytic effect and a reduction in excitability of the heat centers and that any increase in excitability of the heat centers will cause an adjustment to lower body temperatures. The finding that the excitability of the heat centers is largely influenced by the water reserves of the organism is used as proof for the assumption that most paralytic or exciting factors are due to a water displacement. Proofs are offered for such effects of the water balance on the thermotaxic centers.

Author

**N67-40569#** Joint Publications Research Service, Washington, D. C.

**STUDIES OF THE VESTIBULAR APPARATUS OF HUMANS AND ANIMALS**

5 Oct. 1967 35 p refs Transl. into ENGLISH from Vestn. Otorinolaringol. (Moscow), no. 4, 1967 p 3-22 (JPRS-42842: TT-67-33468) CFSTI: HC\$3.00/MF\$0.65

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**N67-40570#** Joint Publications Research Service, Washington, D. C.

**THEORETICAL AND CLINICAL VESTIBULOLOGY**

V. I. Voyachek *In its Studies of the Vestibular App. of Humans and Animals* 5 Oct. 1967 p 1-9 refs (See N67-40569 24-04)

A brief survey on the history of theoretical and clinical studies of vestibular reactions to various stimulations is given. The physiology of motion sickness, objectivization of labyrinth reflexes, vestibular stimulations and their functional patterns are briefly outlined from early studies up to the current space flight age.

G.G.

**N67-40571#** Joint Publications Research Service, Washington, D. C.

**FUNCTIONS OF THE VESTIBULAR ANALYZER IN CONNECTION WITH SPACE FLIGHT**

K. L. Khilov *In its Studies of the Vestibular App. of Humans and Animals* 5 Oct. 1967 p 10-22 refs (See N67-40569 24-04)

Screening for space flight service by comparing vestibular sensitivity of pilots takes place by subjecting applicants to Kepler trajectory flights in jets. During rapid climbing and acceleration up to 5 g, terrestrial gravity is overcome and a state of weightlessness occurs that lasts up to 35 seconds. Coriolis acceleration effects on the function of the semicircular canals of the vestibular organ can be tested by rotating the applicant on a centrifuge, or by detecting latent sensitivities to Coriolis acceleration through chloral hydrate intake before acceleration tests. Subjects are most sensitive

to the acceleration effect when their head and trunk are inclined backward on the centrifuge. Acceleration on swings with sudden stop and go situations is recommended for testing resistance ability to sudden g forces, and a combination of tests for a final selection. If after administration of 20 ml of a 5% chloral hydrate solution the subject retains stability of his vestibular analyzer to stimuli, then this candidate is fully qualified to serve as an astronaut. G.G.

**N67-40572#** Joint Publications Research Service, Washington, D. C.

**INTERRUPTION OF THE FUNCTION OF OTOLITHIC FORMATIONS BY MEANS OF IONIZING RADIATION**

N. I. Arlaschenko, Yu. G. Grigor'yev, and A. B. Malinin *In its Studies of the Vestibular App. of Humans and Animals* 5 Oct. 1967 p 23-31 refs (See N67-40569 24-04)

Applicators saturated with a radioactive isotope were introduced into the vestibular perilymphatic space of rabbits in order to observe sensitivity to radionecrosis of the inner ear tissue. The first vestibular reactions were those typical of receptor function suppression and the appearance of nystagmus; accumulation of radiation energy by the tissues surrounding the radioactive source later interrupted ampular apparatus functions, induced distinct turning and inclination of the animal's head, and caused the complete death not only of the otolithic, but also of the ampular apparatus.

G.G.



A67-40766

## IAA ENTRIES

**A67-40594 #**

## TRAINING IN THE SPACE ENVIRONMENT.

R. E. Biddinger (Martin Marietta Corp., Martin Co. Engineering Operations and Logistics Dept., Denver, Colo.).

IN: LOGISTICS IN THE SEVENTIES; SOCIETY OF LOGISTICS ENGINEERS, ANNUAL CONVENTION, 2ND, WASHINGTON, D.C., SEPTEMBER 19, 20, 1967, PROCEEDINGS. [A67-40579 23-34] Long Beach, Calif., Society of Logistics Engineers, 1967, p. 264-273.

Analysis of training requirements for astronauts and astronaut-support personnel. The Personnel/Function Matrix provides: an official list of personnel by title, personnel work areas, numbers of personnel by type and work area, functions performed by personnel and personnel skills and knowledge requirements by function. The Personnel/Training Level Matrix provides: a list of training-area requirements, a list of personnel, by type, determined to require training for the listed instructional areas, and the level of training required by personnel for an instructional area. P.v.T.

**A67-40763**

## CERTAIN PROBLEMS OF SPACE NEUROPHYSIOLOGY [NEKOTORYE VOPROSY KOSMICHESKOI NEIROFIZIOLOGII].

Edited by N. N. Livshits.

Moscow, Izdatel'stvo Nauka, 1967. 232 p. 562 refs. In Russian.

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INTRODUCTION [VVEDENIE]. N. N. Livshits, p. 3-8.

EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONAL STATE OF THE VESTIBULAR ANALYZER - REVIEW OF THE LITERATURE [VLIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKSIONAL'NOE SOSTOYANIE VESTIBULIARNOGO ANALIZATORA - OBZOR LITERATURY]. Z. I. Apanasenko, p. 9-44. [See A67-40764 23-04]

DEFINITION, TERMINOLOGY, AND CLASSIFICATION OF EXPERIMENTAL ACCELERATIONS [USKORENIA V EKSPERIMENTE - OPREDELENIA, TERMINOLOGIYA, KLASSIFIKATSIIYA]. V. Ia. Klimovitskii, p. 45-56. [See A67-40765 23-05]

GENERAL AND CEREBRAL HEMODYNAMICS AND THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM DURING ACCELERATIONS - REVIEW OF THE LITERATURE [OBSHCHAYA I TSEREBRAL'NAYA GEMODINAMIKA I FUNKTSII TSENTRAL'NOI NERVOI SISTEMY V USLOVIYAKH DEISTVIA USKORENII - OBZOR LITERATURY]. V. Ia. Klimovitskii, N. N. Livshits, and M. I. Rodionov, p. 57-92. [See A67-40766 23-04]

EFFECT OF DIFFERENTLY TIMED OVERALL GAMMA IRRADIATIONS ON SPINAL-CORD REFLEX ACTIVITY - ROLE OF THE TIME FACTOR IN RADIATION REACTIONS OF THE NERVOUS SYSTEM [VLIANIE OBSHCHIKH GAMMA-OBLUCHENII, RAZLICHNO RASPREDELENNYKH VO VREMENI, NA REFLEKTORNUIU DEIATEL'NOST' SPINNOGO MOZGA - ROL' FAKTORA VREMENI V LUCHEVYKH REAKTSIIYAKH NERVOI SISTEMY]. M. A. Kuznetsov, p. 93-124. [See A67-40767 23-04]

COMPLEX EFFECT OF TEN EXPOSURES TO VIBRATION AND FRACTIONATED GAMMA IRRADIATION ON THE SPINAL-CORD ACTIVITY OF GUINEA PIGS [KOMPLEKSNOE DEISTVIE DESIATKRATNOI VIBRATSII I FRAKTSIONIROVANNOGO GAMMA-OBLUCHENIIA NA SOSTOYANIE SPINNOMOZGOVOI REFLEKTORNOI DEIATEL'NOSTI MORSKIKH SVINOK]. M. A. Kuznetsova, p. 125-144. [See A67-40768 23-04]

FUNCTIONAL RELATION BETWEEN OXIDATION, METABOLISM, BLOOD FLOW VOLUME RATE, AND BRAIN TEMPERATURE DURING VIBRATION [O FUNKSIONAL'NOI SVIAZI MEZHDU OKISLITEL'NYM METABOLIZMOM, OB'EMNOI SKOROŠT'IU KROVOTOKA I TEMPERATUROI MOZGA PRI VIBRATSII]. L. D. Luk'ianova and V. Ia. Klimovitskii, p. 145-153. [See A67-40769 23-04]

EFFECTS OF HYPERGRAVITY AND ACUTE HYPOXIA ON THE RESPIRATORY PROCESSES IN BRAIN TISSUES [VLIANIE GIPERVESOMOSTII I OSTROGO KISLORODNOGO GOLODANIA NA PROTSESSY TKANEVOGO DYKHANIYA GOLOVNOGO MOZGA]. B. M. Savin and E. D. Avenirova, p. 154-158. [See A67-40770 23-04]

REMOTE AFTEREFFECT OF TRANSVERSE ACCELERATIONS ON CONDITIONED ALIMENTARY REFLEXES OF RATS [OTDALENNOE POSLEDEISTVIE POPERECHNYKH USKORENII NA PISHCHEVYE USLOVNYE REFLEKSY KRYSA]. N. N. Livshits and E. S. Meizerov, p. 159-168. [See A67-40771 23-04]

COMPLEX EFFECT OF ACCELERATIONS AND IONIZING RADIATIONS ON CONDITIONED REFLEXES OF RATS [KOMPLEKSNOE DEISTVIE USKORENII I IONIZIRUIUSHCHIKH IZLUCHENII NA USLOVNYE REFLEKSY KRYSA]. N. N. Livshits, E. S. Meizerov, R. M. Zakirova, and V. A. Tikhaia, p. 168-183. [See A67-40772 23-04]

EFFECT OF PRECENTRIFUGATION ON THE RADIATION REACTIONS OF THE VESTIBULAR ANALYZER [VLIANIE PREDVARITEL'NOGO TSENTRIFUGIROVANIYA NA LUCHEVYE REAKTSII VESTIBULIARNOGO ANALIZATORA]. Z. I. Apanasenko, p. 184-202. [See A67-40773 23-04]

**A67-40764 #**

## EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONAL STATE OF THE VESTIBULAR ANALYZER - REVIEW OF THE LITERATURE [VLIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKSIONAL'NOE SOSTOYANIE VESTIBULIARNOGO ANALIZATORA - OBZOR LITERATURY].

Z. I. Apanasenko.

IN: CERTAIN PROBLEMS OF SPACE NEUROPHYSIOLOGY [NEKOTORYE VOPROSY KOSMICHESKOI NEIROFIZIOLOGII].

Edited by N. N. Livshits.

Moscow, Izdatel'stvo Nauka, 1967, p. 9-44. In Russian.

Review of bibliography dealing with the effects of vibration, acceleration, and ionizing radiation on the functions of the vestibular analyzer, covering papers published through 1965. The review shows that the vestibular analyzer is responsible for various disorders in motor coordination and spatial orientation during parabolic and orbital flights and points out a general lack of information on many aspects of the subject. V.Z.

**A67-40765 #**

## DEFINITION, TERMINOLOGY, AND CLASSIFICATION OF EXPERIMENTAL ACCELERATIONS [USKORENIA V EKSPERIMENTE - OPREDELENIA, TERMINOLOGIYA, KLASSIFIKATSIIYA].

V. Ia. Klimovitskii.

IN: CERTAIN PROBLEMS OF SPACE NEUROPHYSIOLOGY [NEKOTORYE VOPROSY KOSMICHESKOI NEIROFIZIOLOGII].

Edited by N. N. Livshits.

Moscow, Izdatel'stvo Nauka, 1967, p. 45-56. In Russian.

Review of definitions, terminology, and classifications proposed by various authors for acceleration as a concept. Classifications of acceleration forces suggested by Gauer, Chambers, Fried, Savin, and Zuidema are discussed. The need for a single universal concept of acceleration incorporating both the direction and magnitude of acceleration is indicated. V.Z.

**A67-40766 #**

## GENERAL AND CEREBRAL HEMODYNAMICS AND THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM DURING ACCELERATIONS - REVIEW OF THE LITERATURE [OBSHCHAYA I TSEREBRAL'NAYA GEMODINAMIKA I FUNKTSII TSENTRAL'NOI NERVOI SISTEMY V USLOVIYAKH DEISTVIA USKORENII - OBZOR LITERATURY].

V. Ia. Klimovitskii, N. N. Livshits, and M. I. Rodionov.

IN: CERTAIN PROBLEMS OF SPACE NEUROPHYSIOLOGY [NEKOTORYE VOPROSY KOSMICHESKOI NEIROFIZIOLOGII].

Edited by N. N. Livshits.

Moscow, Izdatel'stvo Nauka, 1967, p. 57-92. In Russian.

Review of papers on the mechanism of hemodynamic disorders related to circulatory disorders in the central nervous system during accelerations. General and local hemodynamic effects produced by positive and negative acceleration applied along the three anatomical axes are discussed, noting the cumulative behavior of these effects. Evidence is found for the existence of causes of disorders of vision.

## A67-40767

other than a blood pressure drop in the cerebral arteries. Qualitative indications for a substantial effect of circulatory disorders on the reactions of the central nervous system to acceleration are noted. Insufficient quantitative knowledge of this effect is indicated, and further studies are urged. V. Z.

### A67-40767 #

EFFECT OF DIFFERENTLY TIMED OVERALL GAMMA IRRADIATIONS ON SPINAL-CORD REFLEX ACTIVITY - ROLE OF THE TIME FACTOR IN RADIATION REACTIONS OF THE NERVOUS SYSTEM [VLIANIE OBSSHCHIKH GAMMA-OBLUCHENII, RAZLICHNO RASPREDELENNYKH VO VREMENI, NA REFLEKTORNUII DELATEL'NOST' SPINNOGO MOZGA - ROL' FAKTORA VREMENI V LUCHEVYKH REAKTSIIAKH NERVNOI SISTEMY].

M. A. Kuznetsova.

IN: CERTAIN PROBLEMS OF SPACE NEUROPHYSIOLOGY [NEKOTORYE VOPROSY KOSMICHESKOI NEIROFIZIOLOGII].

Edited by N. N. Livshits.

Moscow, Izdatel'stvo Nauka, 1967, p. 93-124. In Russian.

Study of the effect of gamma radiation on a group of 28 male guinea pigs given a 500-r dose in a single session or as a sequence of 100-r doses twice a week, at a rate of 52 r/min. The death rate was 33% after repeated smaller exposures and almost 100% after a single exposure to the same total dose. Various effects of the time factor of exposure on the organisms of guinea pigs are discussed. V. Z.

### A67-40768 #

COMPLEX EFFECT OF TEN EXPOSURES TO VIBRATION AND FRACTIONATED GAMMA IRRADIATION ON THE SPINAL-CORD ACTIVITY OF GUINEA PIGS [KOMPLEKSNOE DEISTVIE DESIATIKRATNOI VIBRATSII I FRAKSIONIROVANNOGO GAMMA-OBLUCHENIIA NA SOSTOIANIE SPINNO MOZGOVOI REFLEKTORNOI DELATEL'NOSTI MORSKIKH SVINOK].

M. A. Kuznetsova.

IN: CERTAIN PROBLEMS OF SPACE NEUROPHYSIOLOGY [NEKOTORYE VOPROSY KOSMICHESKOI NEIROFIZIOLOGII].

Edited by N. N. Livshits.

Moscow, Izdatel'stvo Nauka, 1967, p. 125-144. In Russian.

Study of the combined effect of a sequence of five 100-5 doses of gamma-radiation alternating with five 15-min exposures to 0.4 mm vibrations at 70 Hz on the spinal-cord reflex activity of a group of 16 guinea pigs. Depression of the reflex responses and stimulation of parabolic states of the unconditioned defensive motor reaction are noted. V. Z.

### A67-40769 #

FUNCTIONAL RELATION BETWEEN OXIDATION METABOLISM, BLOOD FLOW VOLUME RATE, AND BRAIN TEMPERATURE DURING VIBRATION [O FUNKSIONAL'NOI SVIAZI MEZHDU OKISLITEL'NYM METABOLIZMOM, OB'EMNOI SKOROST'IU KROVOTOKA I TEMPERATUROI MOZGA PRI VIBRATSII].

L. D. Luk'ianova and V. Ia. Klimovitskii.

IN: CERTAIN PROBLEMS OF SPACE NEUROPHYSIOLOGY [NEKOTORYE VOPROSY KOSMICHESKOI NEIROFIZIOLOGII].

Edited by N. N. Livshits.

Moscow, Izdatel'stvo Nauka, 1967, p. 145-153. In Russian.

Study of the temperature and blood flow rate vs oxygen supply and consumption in the brains of a group of 10 albino rats subjected to 15-min vertical vibrations at 70 Hz with an amplitude of 0.4 mm. Polarography is used for studying the oxidation metabolism in the brain tissues, and the blood-flow volume rate in the sinus venosus is measured with Klimovitskii pulse sensors. A decrease in temperature and stimulation of blood supply and oxygen consumption are established during vibration. V. Z.

### A67-40770 #

EFFECTS OF HYPERGRAVITY AND ACUTE HYPOXIA ON THE RESPIRATORY PROCESSES IN BRAIN TISSUES [VLIANIE GIPER-VEOMOSTI I OSTROGO KISLORODNOGO GOLODANIYA NA PROTSESSY TKANEVOGO DYKHANIYA GOLOVNOGO MOZGA].

B. M. Savin and E. D. Avenirova.

IN: CERTAIN PROBLEMS OF SPACE NEUROPHYSIOLOGY [NEKOTORYE VOPROSY KOSMICHESKOI NEIROFIZIOLOGII].

Edited by N. N. Livshits.

Moscow, Izdatel'stvo Nauka, 1967, p. 154-158. In Russian.

Note on a study of the respiratory processes in the brain tissues of a group of 21 rabbits subjected to a sequence of four 30-sec 25-g accelerations in the head-to-pelvis direction in a pressure chamber simulating one-minute ascents to an altitude of 14,000 m. The Warburg method is used in the study of oxygen consumption in the brain tissues, revealing no appreciable difference between experimental and control animals. V. Z.

### A67-40771 #

REMOTE AFTEREFFECT OF TRANSVERSE ACCELERATIONS ON CONDITIONED ALIMENTARY REFLEXES OF RATS [OTDALENNOE POSLEDEISTVIE POPERECHNYKH USKORENII NA PISHCHEVYE USLOVNYE REFLEKSY KRYIS].

N. N. Livshits and E. S. Meizerov.

IN: CERTAIN PROBLEMS OF SPACE NEUROPHYSIOLOGY [NEKOTORYE VOPROSY KOSMICHESKOI NEIROFIZIOLOGII].

Edited by N. N. Livshits.

Moscow, Izdatel'stvo Nauka, 1967, p. 159-168. In Russian.

Study of the effect of 8-min 10-g transverse accelerations on the conditioned alimentary motor reflexes of a group of rats. The prolonged depression of higher nervous activity caused by acceleration is discussed. V. Z.

### A67-40772 #

COMPLEX EFFECT OF ACCELERATIONS AND IONIZING RADIATIONS ON CONDITIONED REFLEXES OF RATS [KOMPLEKSNOE DEISTVIE USKORENII I IONIZIRUUSHCHIKH IZLUCHENII NA USLOVNYE REFLEKSY KRYIS].

N. N. Livshits, E. S. Meizerov, R. M. Zakirova, and V. A. Tikhiaia.

IN: CERTAIN PROBLEMS OF SPACE NEUROPHYSIOLOGY [NEKOTORYE VOPROSY KOSMICHESKOI NEIROFIZIOLOGII].

Edited by N. N. Livshits.

Moscow, Izdatel'stvo Nauka, 1967, p. 169-183. In Russian.

Study of the conditioned alimentary reflexes in a group of 12 rats subjected at two- and then one-week intervals to a sequence of three 8-min exposures to 10-g accelerations followed alternately by irradiation with 50-r doses of X rays. A slight alleviating effect of preacceleration on radiation leukopenia is indicated. V. Z.

### A67-40773 #

EFFECT OF PRECENTRIFUGATION ON THE RADIATION REACTIONS OF THE VESTIBULAR ANALYZER [VLIANIE PREDVARTIEL'NOGO TSENTRIFUGIROVANIYA NA LUCHEVYE REAKTSII VESTIBULIARNOGO ANALIZATORA].

Z. I. Apanasenko.

IN: CERTAIN PROBLEMS OF SPACE NEUROPHYSIOLOGY [NEKOTORYE VOPROSY KOSMICHESKOI NEIROFIZIOLOGII].

Edited by N. N. Livshits.

Moscow, Izdatel'stvo Nauka, 1967, p. 184-202. In Russian.

Study of the function of the vestibular analyzer in a group of guinea pigs exposed to 15-min 8-g accelerations in the breast-to-back direction, followed by irradiation with a 500-r dose of gamma rays. Substantial stimulation of the spontaneous electrical activity of the extensor muscles of the hind legs is established in experimental animals. V. Z.

### A67-40801 \*

STUDIES ON THE RAPIDLY LABELED RNA OF RABBIT BONE MARROW CELLS.

Jerry B. Lingrel (Cincinnati, University, College of Medicine, Dept. of Biological Chemistry, Cincinnati, Ohio).

Biochimica et Biophysica Acta, vol. 142, 1967, p. 75-88. 27 refs. PHS Grants No. GM-10999; No. ISO-FR-5408; Grant No. NGR-36-004-014.

Ribonucleic acid synthesis in rabbit bone marrow preparations containing high percentages of erythroid cells has been studied. The RNA labeled at early times is high molecular weight as determined by sucrose density-gradient centrifugation and can be resolved into three components by methyl-esterified albumin-kieselguhr column chromatography. Pulse labeling studies reveal that the radioactivity of these three rapidly labeled RNAs is transferred to rRNA during the course of the incubation. In the presence of actinomycin the label is again lost from these fractions; however, under these conditions only about 26% of the label appears in rRNA. This is interpreted as indicating that the majority of the early labeled RNA is

turning over rapidly and is not a direct precursor to rRNA. Two of the rapidly labeled RNAs exhibit base compositions similar to DNA, supporting the hypothesis that they are not rRNA precursors. The other has a base composition similar to rRNA and, as some label does accumulate in rRNA in the absence of RNA synthesis de novo, this rapidly labeled RNA may be a rRNA precursor. The two fractions whose base compositions are "DNA-like" and exhibit a short half-life are thought to be mRNA. (Author)

**A67-40823 \***

**METABOLIC DEPRESSION IN ANIMALS EXPOSED TO AIR AFTER LIVING IN A He-O<sub>2</sub> ENVIRONMENT.** Rodney A. Rhoades (Ohio State University, College of Medicine, Dept. of Physiology, Environmental Physiology Laboratory, Columbus Ohio; Pennsylvania State University, Center for Air Environment Studies, University Park, Pa.), Ronald A. Wright, and Harold S. Weiss (Ohio State University, College of Medicine, Dept. of Physiology, Environmental Physiology Laboratory, Columbus, Ohio). *Society for Experimental Biology and Medicine, Proceedings*, vol. 124, 1967, p. 176-180. 18 refs. Grants No. NSG-295-62; No. NSG-36-008-004.

Description of experiments performed on mice, rats, and chicks, which were maintained in a 79% He-21% O<sub>2</sub> environment for 10 to 22 days. When measured in He-O<sub>2</sub>, their metabolism was higher than that of controls maintained and measured in air. On transfer to 100% O<sub>2</sub>, the metabolism of the controls remained relatively unchanged, but that of the experimentals fell to control levels. On first exposure to air, the animals maintained in He-O<sub>2</sub> showed a significant 7 to 11% depression in O<sub>2</sub> consumption below control. The suggestion is made that the period of denitrogenation preceding the measurements may have sensitized He-O<sub>2</sub> animals to the depressant properties of N<sub>2</sub>. P.v.T.

**A67-40842**

**AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 6TH, WASHINGTON, D.C., MAY 15-18, 1967, PROCEEDINGS.** Boston, American Association for Contamination Control, 1967. 254 p. Members, \$15.; nonmembers, \$18.

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**DEVELOPMENT OF AN INCREASED SAMPLING RATE MONITORING SYSTEM.** W. J. Whitfield and J. C. Mashburn (Sandia Corp., Albuquerque, N. Mex.), p. 4, 5. [See A67-40843 23-05]

**CONTAMINATION DETECTION BY ANALYTICAL INSTRUMENTATION.** N. L. Crump and T. T. Bartels (McDonnell Douglas Corp., St. Louis, Mo.), p. 34-41. [See A67-40844 23-14]

**BIOLOGICAL CONTAMINATION CONTROL CONCEPTS FOR THE LUNAR RECEIVING LABORATORY.** William W. Kemmerer, Bennie C. Wooley (NASA, Manned Spacecraft Center, Houston, Tex.), and G. Briggs Phillips (Becton, Dickinson and Co., Rutherford, N.J.), p. 71-73. [See A67-40845 23-05]

**VERIFICATION OF PARTICULATE CLEANLINESS LEVELS IN FLUID SYSTEMS.** Milt W. McKenzie (Martin Marietta Corp., Denver, Colo.), p. 81-84. [See A67-40846 23-03]

**METHODS OF MEASURING SLOUGH CHARACTERISTICS OF CLEAN PACKAGING MATERIALS.** J. A. Gieseke, W. E. Clark, J. M. Pilcher (Battelle Memorial Institute, Columbus, Ohio), and T. W. Lewis (NASA, Marshall Space Flight Center, Huntsville, Ala.), p. 85-90. 6 refs. [See A67-40847 23-11]

**CONTAMINATION CONTROL IN THE SATURN S-IVB STAGE HYDRAULIC SYSTEM.** Gordon Walker (McDonnell Douglas Corp., Santa Monica, Calif.), p. 132-137. [See A67-40848 23-03]

**A SAMPLING BOTTLE FOR FUEL AND OXIDIZER.** J. A. Barclay, III (Aerojet-General Corp., Las Cruces, N. Mex.), p. 138. [See A67-40849 23-14]

**CONTAMINANTS VS MICROMETEORITES FROM THE 1965 LEONID METEOR SHOWER.** M. B. Blanchard, N. H. Farlow, G. V. Ferry (NASA, Ames Research Center, Moffett Field, Calif.), and H. D. Shade (Laboratory for Electronics, Inc., Richmond, Calif.), p. 139-145. [See A67-40850 23-11]

**COMPARATIVE LEVELS OF MICROBIAL CONTAMINATION IN CLEAN ROOMS USED FOR THE ASSEMBLY AND TEST OF LUNAR SPACECRAFT.** Gerald J. Tritz, Norman D. Fields, and Bliss

Moore (U.S. Public Health Service, Cape Kennedy, Fla.), p. 149-152. [See A67-40851 23-05]

**ASSESSMENT OF MICROBIAL CONTAMINATION ON SURFACES OF SPACE HARDWARE BY ULTRASONICS.** John R. Puleo, Martin S. Favero, and Norman J. Petersen (U.S. Public Health Service, Phoenix, Ariz.), p. 153-156. 14 refs. [See A67-40852 23-05]

**AN APPROACH TO THE ESTIMATION OF MICROBIAL CONTAMINATION ON SPACECRAFT.** Jack H. Fooks (NASA, Office of Space Science and Applications, Washington, D.C.), p. 157-163. 14 refs. [See A67-40853 23-05]

**LUNAR ORBITER SPACECRAFT - SUPERCLEANING PROCESSES AND CLEANLINESS REQUIREMENTS.** Milton Van Slyke (Boeing Co., Seattle, Wash.), p. 168-170. [See A67-40854 23-05]

**CLEAN ROOM JUSTIFICATION GUIDELINES.** William A. Hume (McDonnell Douglas Corp., St. Louis, Mo.), p. 213-217. 7 refs. [See A67-40855 23-11]

**A STUDY OF PRIMATE SKIN AND BODY PARTICULATE MATTER AND INDIGENOUS PRIMATE MICROFLORA.** Myron H. Bengson, John R. Gillis (General Electric Co., Valley Forge, Pa.), and John H. Hoffnagle (General Electric Co., Philadelphia, Pa.), p. 235-237. [See A67-40856 23-04]

**REDUCTION OF MICROBIAL SHEDDING FROM HUMANS.** Dick K. Riemensnyder (U.S. Public Health Service, Atlanta, Ga.), p. 242-244. 11 refs. [See A67-40857 23-05]

**CERTAIN ASPECTS OF MICROBIAL INTERACTION BETWEEN MEN AND THEIR ENVIRONMENT IN CLOSED SYSTEMS.** L. S. Gall (International Business Machines Corp., Bethesda, Md.) and P. E. Riely (Fairchild Hiller Corp., Farmingdale, N.Y.), p. 245. [See A67-40858 23-05]

**A67-40843 \***

**DEVELOPMENT OF AN INCREASED SAMPLING RATE MONITORING SYSTEM.**

W. J. Whitfield and J. C. Mashburn (Sandia Corp., Sandia Laboratory, Albuquerque, N. Mex.).

IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 6TH, WASHINGTON, D.C., MAY 15-18, 1967, PROCEEDINGS. [A67-40842 23-05] Boston, American Association for Contamination Control, 1967, p. 4, 5. NASA Contract No. R-09-019-040.

Discussion of the requirements for setting up a laboratory to identify particulate contaminants. The space allotment and air-conditioning of the facilities are illustrated and discussed. Emphasis is placed on the actual microscopic and ancillary equipment needed by the morphologist to identify particulates. The specialized equipment is described in some detail. Personnel requirements are discussed. M.M.

**A67-40845 \***

**BIOLOGICAL CONTAMINATION CONTROL CONCEPTS FOR THE LUNAR RECEIVING LABORATORY.**

William W. Kemmerer, Bennie C. Wooley (NASA, Manned Spacecraft Center, Houston, Tex.), and G. Briggs Phillips (Becton, Dickinson and Co., Rutherford, N.J.).

IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 6TH, WASHINGTON, D.C., MAY 15-18, 1967, PROCEEDINGS. [A67-40842 23-05] Boston, American Association for Contamination Control, 1967, p. 71-73.

Description of the back-contamination program for preventing the contamination of the earth environment by lunar material. The program is unique in its dual requirement for preventing the lunar sample from being contaminated with earth material. The successful conduct of the containment program involves not only the federal agencies represented on the Interagency Committee but, in addition, concerns and is dependent on a segment of the Manned Spacecraft Center staff. These include the astronauts and related personnel, the spacecraft design engineers, the landing and recovery personnel, and the scientific staff. Much of the program will require ongoing testing, rigid standards, specifications, and training. M.M.

**A67-40851 \***

**COMPARATIVE LEVELS OF MICROBIAL CONTAMINATION IN CLEAN ROOMS USED FOR THE ASSEMBLY AND TEST OF LUNAR SPACECRAFT.**

## A67-40852

Gerald J. Tritz, Norman D. Fields, and Bliss Moore (U.S. Public Health Service, Communicable Disease Center, Investigations Branch, Sterility Control Laboratory, Cape Kennedy, Fla.).  
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 6TH, WASHINGTON, D.C., MAY 15-18, 1967, PROCEEDINGS. [A67-40842 23-05]  
Boston, American Association for Contamination Control, 1967, p. 149-152.  
NASA Contract No. R-137.

Microbiological assays were performed in the assembly and test areas where the three unmanned lunar spacecraft programs were in operation. The Anchored Interplanetary Monitoring Platform was housed in a laminar flow clean room while in residence at the AFETR at Cape Kennedy. The Surveyor was housed in a conventional clean room where few environmental controls existed. The Lunar Orbiter occupied a conventional clean room where strict environmental controls were practiced. Comparative studies indicated that fallout of airborne microorganisms onto stainless steel surfaces was lower by at least one log in the laminar flow clean room, as compared to the conventional clean room which had strict environmental controls. This occurred despite similar levels of airborne microorganisms detected by air samplers in the rooms. The level of microorganisms which accumulated on stainless steel strips in the conventional clean room with strict environmental controls was about the same as the level in the conventional clean room with few environmental controls. The level of airborne microorganisms, however, was much greater in the conventional clean room with lax environmental controls than in the conventional clean room with strict environmental controls. (Author)

## A67-40852 \*

### ASSESSMENT OF MICROBIAL CONTAMINATION ON SURFACES OF SPACE HARDWARE BY ULTRASONICS.

John R. Puleo, Martin S. Favero, and Norman J. Petersen (U.S. Public Health Service, Communicable Disease Center, Phoenix, Ariz.).  
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 6TH, WASHINGTON, D.C., MAY 15-18, 1967, PROCEEDINGS. [A67-40842 23-05]  
Boston, American Association for Contamination Control, 1967, p. 153-156. 14 refs.  
NASA Contract No. R-137.

Bath-type ultrasonicators were evaluated for the ability to remove viable microorganisms from various surfaces for subsequent enumeration. The tests were related to attempts to assure sterilization of Mars Landers. Test surfaces were polished stainless steel, smooth glass, frosted glass, and electronic components. The position of contaminated surfaces in relation to the ultrasonic energy source, distance of the ultrasonic source from the test surfaces, and temperature of the fluid menstruum were some of the factors which influenced recovery. The experimental systems included both naturally-occurring microbial contamination and artificial contamination with spores of *Bacillus subtilis* var. *niger*. The results showed that ultrasonication was a more reliable and efficient method than mechanical agitation. Conditions which increased the number of microorganisms recovered and the percent recovery by ultrasonication were: use of cold peptone water as the liquid menstruum, placing the sample bottle on the bottom of the ultrasonic tank, and facing the contaminated surfaces towards the energy source. Studies also demonstrated that ultrasonic energy could be effectively used for eluting microorganisms from cotton swabs. (Author)

## A67-40853 \*

### AN APPROACH TO THE ESTIMATION OF MICROBIAL CONTAMINATION ON SPACECRAFT.

Jack H. Fooks (NASA, Office of Space Science and Applications, Washington, D.C.).  
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 6TH, WASHINGTON, D.C., MAY 15-18, 1967, PROCEEDINGS. [A67-40842 23-05]  
Boston, American Association for Contamination Control, 1967, p. 157-163. 14 refs.

A procedure has been devised to provide an estimate of the microbial burden on the surfaces of spacecraft utilizing numerical values obtained from swab samples, environmental settling strips,

and environmental air samples. Essentially, this involves the determination of a deposition rate for each of the environments where the spacecraft is exposed and prorating the particulate accumulation in proportion to the residence time. Relationships between vegetative and spore microbial forms resulting from ancillary studies have been verified by the results of the field analyses. These verifications provided confidence that other empirical assumptions could be made relative to physical contact, distribution of types of organisms on surfaces, and effects of storage in a controlled environment. The estimated composite maximum launch value was  $5 \times 10^5$  organisms. (Author)

## A67-40854

### LUNAR ORBITER SPACECRAFT - SUPERCLEANING PROCESSES AND CLEANLINESS REQUIREMENTS.

Milton Van Slyke (Boeing Co., Seattle, Wash.).  
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 6TH, WASHINGTON, D.C., MAY 15-18, 1967, PROCEEDINGS. [A67-40842 23-05]  
Boston, American Association for Contamination Control, 1967, p. 168-170.

Description of a proposed supercleaning process for the Lunar Orbiter. The process calls for personnel training, clean-room garments, the use of chemical cleaners, special packaging requirements, inspection for particulate contamination, and cleaning prior to clean-room entry. The following conclusions are drawn: (1) the training program for those who work in a clean room should be expanded to other personnel such as designers, planners, clean-room supervisors, facilities engineers, materials and process engineers, etc.; (2) there is at present no efficient process for supercleaning packaging films such as nylon, saran, and aclar to the requirements for the Lunar Orbiter; (3) ultrasonic cleaning is necessary for the attainment of supercleaning in an erosive process; (4) a standard test is necessary to measure the efficiency of ultrasonic cleaning; and (5) a nationwide standard is needed for supercleaning and parts-cleanliness levels which will enable both primes and subcontractors to meet on common grounds. M.M.

## A67-40856 \* #

### A STUDY OF PRIMATE SKIN AND BODY PARTICULATE MATTER AND INDIGENOUS PRIMATE MICROFLORA.

Myron H. Bengson, John R. Gillis (General Electric Co., Valley Forge, Pa.), and John H. Hoffnagle (General Electric Co., Missile and Space Div., Re-Entry Systems Dept., Philadelphia, Pa.).  
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 6TH, WASHINGTON, D.C., MAY 15-18, 1967, PROCEEDINGS. [A67-40842 23-05]  
Boston, American Association for Contamination Control, 1967, p. 235-237.  
Contract No. NAS 2-1900.

Description of an experimental approach made to obtain a preliminary evaluation of the potential contamination of the equipment by a primate passenger during a 30-day orbit around the earth. Simulated tests were carried out to determine the contamination of the equipment with viable and/or nutrient biological products. The contamination is thought to consist of accumulative deposits of animal-originated nutrient matter and resulting organic growth, in the air filtration equipment and in the wicking and phase-separator membrane of the moisture-separation equipment. This growth is due to bacteria and fungi from the experimental animal, the capsule air, and the hardware. The composition of the nutrient medium synthesized to simulate the expected capsule atmosphere is tabulated. M.F.

## A67-40857 \*

### REDUCTION OF MICROBIAL SHEDDING FROM HUMANS.

Dick K. Riemensnyder (U.S. Public Health Service, Communicable Disease Center, Biophysics Section, Atlanta, Ga.).  
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 6TH, WASHINGTON, D.C., MAY 15-18, 1967, PROCEEDINGS. [A67-40842 23-05]  
Boston, American Association for Contamination Control, 1967, p. 242-244. 11 refs.  
NASA Contract No. R-137.

Using a stainless steel shedding chamber (microbiotank) as a sterile environment, studies were made on the quantitative shedding of microorganisms. Several types of clean-room clothing reduced

the shed rate for humans. It appeared that good personal hygiene also was important in reducing rates of shedding. (Author)

#### A67-40858

##### CERTAIN ASPECTS OF MICROBIAL INTERACTION BETWEEN MEN AND THEIR ENVIRONMENT IN CLOSED SYSTEMS.

L. S. Gall (International Business Machines Corp., Federal Systems Div., Space Systems Center, Bethesda, Md.) and P. E. Riely (Fairchild Hiller Corp., Republic Aviation Div., Farmingdale, N. Y.).

IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 6TH, WASHINGTON, D. C., MAY 15-18, 1967, PROCEEDINGS. [A67-40842 23-05] Boston, American Association for Contamination Control, 1967, p. 245.

Attempt to determine the factors influencing microbial interactions between men and their environment in closed systems. The results of tests conducted on eight male subjects showed that the type of micro-organisms present in the environmental areas as the tests proceeded reflected the harder types of micro-organisms isolated from the subjects, such as staphylococci, streptococci, and coliform-type gram-negative rods. In addition, diplococci, bacilli, and slender gram-negative rods were found in the environment. It appears that the primary factors which influenced the kinds and numbers of organisms were the personal hygiene procedures and the degree of crowding. M. F.

#### A67-40999 \*

##### LIFE DETECTION BY ATMOSPHERIC ANALYSIS.

Dian R. Hitchcock (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.) and James E. Lovelock (California Institute of Technology, Jet Propulsion Laboratory, Bio-Science Section, Pasadena, Calif.).

*Icarus*, vol. 7, Sept. 1967, p. 149-159. 16 refs. Contract No. NASw-871.

Living systems maintain themselves in a state of relatively low entropy at the expense of their nonliving environments. We may assume that this general property is common to all life in the solar system. On this assumption, evidence of a large chemical free energy gradient between surface matter and the atmosphere in contact with it is evidence of life. Furthermore, any planetary biota which interacts with its atmosphere will drive that atmosphere to a state of disequilibrium which, if recognized, would also constitute direct evidence of life, provided the extent of the disequilibrium is significantly greater than abiological processes would permit. It is shown that the existence of life on the earth can be inferred from knowledge of the major and trace components of the atmosphere, even in the absence of any knowledge of the nature or extent of the dominant life forms. Knowledge of the composition of the Martian atmosphere may similarly reveal the presence of life there. (Author)

#### A67-41017 \* \*

##### HEPATIC LESIONS PRODUCED BY 32 AND 55 MEV PROTON IRRADIATION.

John J. Ghidoni (Baylor University, College of Medicine, Methodist Hospital, Houston, Tex.), Glenn V. Dalrymple (Arkansas, University, Dept. of Radiology, Little Rock, Ark.), Ian R. Lindsay, Edward Ballinger (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Radiobiology Branch, Brooks AFB, Tex.), Harold L. Kundel (Temple University, Dept. of Radiobiology, Philadelphia, Pa.), and Webb Haymaker (NASA, Ames Research Center, Moffett Field, Calif.).

*Archives of Pathology*, vol. 83, Apr. 1967, p. 370-376. 11 refs. USAF-supported research; Grant No. NGR 44-003-018.

Depth-dose distributions of 32 and 55-Mev protons were qualitatively demonstrated in primate livers. Rhesus monkeys were irradiated through an 8-cm anterior port; one animal received 7000 rads (surface dose) of 32-Mev protons and one received 6000 rads (surface dose) of 55-Mev protons. The hemorrhagic lesions produced by protons of both energies were similar. However, that produced by the higher energy proton beam was present at a greater depth beneath Glisson's capsule (32-Mev proton, 0.5 to 3 mm; 55-Mev proton, 18 to 20.5 mm). Their respective locations were compatible with the calculated positions for the two Bragg peaks. Both lesions displayed extensive necrosis involving both the central

and midzonal lobular regions accompanied by sinusoidal pooling of erythrocytes. The periportal zones contained a spectrum of degenerative cytologic alterations. (Author)

#### A67-41020 \*

##### ATTENTION AND PSYCHOPHYSICAL TIME.

A. B. Kristofferson (McMaster University, Hamilton, Ontario, Canada).

*Acta Psychologica*, vol. 27, 1967, p. 93-100.

National Research Council of Canada Grant No. APB-112; Grant No. NGR-52-059-001.

A theory of central intermittency is proposed in which a central temporal process is assumed to control both the switching of attention between input channels and the transfer of information between central stages. Three very different behavioral measurements are integrated by these assumptions and lead to the conclusion that the temporal process can be thought of as a succession of equally spaced points in time occurring at a rate of approximately 20 points/sec. (Author)

#### A67-41051

##### LASERS AND THE EYE.

J. Mellerio (London, University and Moorfields Eye Hospital, Institute of Ophthalmology, Dept. of Physiological Optics, London, England).

(British Occupational Hygiene Society, Symposium on Protection Against the Dangers of Laser Radiation, London School of Hygiene and Tropical Medicine, London, England, Nov. 7, 1966, Paper.) *Annals of Occupational Hygiene*, Supplement, July 1967, p. 31-39; Discussion, p. 40, 41. 25 refs.

A brief description of laser light is followed by an explanation of how the ruby laser is useful to ophthalmic surgery. The interaction of laser light with tissues is discussed with particular attention to simple absorption and heating which are seen as the main factors in retinal damage. The explosive nature of pulsed laser damage is mentioned. The effects of lasers other than ruby are examined for their surgical use and their degree of hazard, and criteria for determining threshold damage are considered. (Author)

#### A67-41052

##### THE DERIVATION OF MAXIMUM PERMISSIBLE EXPOSURES TO LASER RADIATION.

J. M. Flood (Ministry of Technology, Royal Aircraft Establishment, Weapons Dept., Farnborough, Hants., England).

(British Occupational Hygiene Society, Symposium on Protection Against the Dangers of Laser Radiation, London School of Hygiene and Tropical Medicine, London, England, Nov. 7, 1966, Paper.) *Annals of Occupational Hygiene*, Supplement, July 1967, p. 47-53. 5 refs.

Determination of the safe areas or safety contours in laser experiments both at short laboratory ranges and long ranges through the atmosphere on the basis of the maximum permissible energy density incident on the retina. The two cases of direct and indirect viewing are considered. It is demonstrated that the maximum permissible incident energy density on the pupil depends on the size of the image formed by the laser beam on the retina. Formulas are given for calculating whether a laser can be viewed safely either directly or indirectly. A wide variation in the safety criterion for specular and diffuse reflection is described depending on the characteristics of the reflecting surface placed in the path of the beam. Polar diagrams of four types of reflecting surfaces are examined in terms of their influence on safety level calculations. The effects of atmospheric scattering, attenuation, and temperature are considered, and protective measures are discussed. T.M.

#### A67-41067 \*

##### SPACE MEDICINE IN PERSPECTIVE - A CRITICAL REVIEW OF THE MANNED SPACE PROGRAM.

Charles A. Berry (NASA, Manned Spacecraft Center, Medical Research and Operations Dept., Houston, Tex.).

(American Medical Association, Clinical Convention, 20th, Symposium on Aerospace Medicine, Las Vegas, Nev., Nov. 29, 1966, Paper.) *American Medical Association, Journal*, vol. 201, July 24, 1967, p. 232-241. 11 refs.

## A67-41068

Review, in the light of approximately 2000 man-hours of weightless exposure, of the predicted effects of space flight vs actual findings. Both environmental hazards and effects on man are of less magnitude than anticipated. The principal physiological changes noted are orthostatism for 50 hr postflight as measured with a tilt table, reduced red-cell mass (5 to 20%), and reduced X-ray density (calcium) in bones. No abnormal psychological reactions or vestibular disturbances relating to flight have been seen. Drugs have been prescribed for in-flight use. Extravehicular activity is within physiological tolerance, if the astronaut is tethered and has specific tasks to perform. F.R.L.

## A67-41068

PSYCHOPHYSIOLOGICAL IMPACT OF LOW-ALTITUDE HIGH-SPEED FLIGHT IN A HIGH-PERFORMANCE SINGLE-SEAT AIRCRAFT [INCIDENCES PSYCHOPHYSIQUES DU VOL A BASSE ALTITUDE ET GRANDE VITESSE SUR AVION A HAUTE PERFORMANCE MONOPLACE].

M. Gouars.

*Revue de Médecine Aéronautique et Spatiale*, vol. 6, 1st Quarter, 1967, p. 7-10. In French.

Attempt to define, as carefully as possible, pilot capability in low-level high-speed flying, with analysis of factors which influence the pilot's performance. Experiments made in actual and simulated flight indicate that roughness and buffeting always cause fatigue, but do not noticeably affect performance. The replacement of the central control column by a miniaturized lateral control considerably improves control precision. Experimental studies have also shown that certain vibrational regimes have deleterious effects on pilot behavior. Visual problems (in particular, the idea of work load) constitute the main psychophysiological impact of low-altitude high-speed flight. F.R.L.

## A67-41069

TEMPORARY BLINDNESS BY LIGHTNING STRIKE IN FLIGHT [CECITE TEMPORAIRE PAR FOUDROIEMENT EN VOL].

A. Salvignac, G. Perdiel, P. Desbordes, and J. Chevaleraud (Centre Principal d'Expertise Médicale du Personnel Navigant de l'Aéronautique, Paris, France).

*Revue de Médecine Aéronautique et Spatiale*, vol. 6, 1st Quarter, 1967, p. 11, 12. In French.

Experimental study of light effects (which can be intense) on an aircrew and aircraft safety at the time of a lightning strike. Experimental studies were made and results compared with the few observations made by aircrews affected by a flash. During lightning strikes dazzling flashes, occasional fire balls, sparks, flames, St. Elmo's fire, and smoke have been reported. Temporary blindness lasts from 2 to 30 sec, and a feeling of slowing up of ideation and psychomotor reactions exceeding the time of blindness was observed. It is suggested that the visual functions of an aircrew should be examined after a lightning strike. F.R.L.

## A67-41071

RETINAL ANGIOMATOSIS AND AIRCREW FITNESS [ANGIOMATOSE RETINIENNE ET APTITUDE AU PERSONNEL NAVIGANT].

G. Perdiel, G. Raynaud, J. Chevaleraud, J. M. Gillet, and L. Biard (Centre Principal d'Expertise Médicale du Personnel Navigant de l'Aéronautique, Paris; Hôpital Militaire d'Instruction Dominique Larrey, Services d'Ophthalmologie, Versailles, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 6, 1st Quarter, 1967, p. 23, 24. In French.

Discussion of the effects of retinal angiomatoses, which are congenital (and sometimes hereditary) malformations of the vascular portion of the retina, on the fitness of aircrew for flying. Angiomatoses can be detected by a rigorous and minute inspection of the back of the eye. They contraindicate flying, because these abnormal retinal vessels are weak, and very susceptible to arterial vasodilatation. However, it may be possible for experienced personnel to continue to fly; also, the condition may be corrected by photocoagulation. F.R.L.

## A67-41072

GERM SAMPLINGS AT HIGH ALTITUDE - FIRST RESULTS [PRELEVEMENTS DE GERME EN ALTITUDE - PREMIERS RESULTATS].

M. Maissonnet, H. Seris, and R. Auffret (Laboratoire de Médecine Aérospatiale, Bretigny-sur-Oise, Eure-et-Loir; Centre Hospitalier, Service d'Hygiène Hospitalière, Rouen, Seine-Maritime, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 6, 1st Quarter, 1967, p. 25-28. In French.

Sampling of germs in the atmosphere by means of a hydroaeroscope, a metallic cylinder with an entry orifice for the probe tube affixed to the interior, and an exit orifice. The particles drop directly on culture media contained in Petri dishes, under the influence of a magnetic field. Test installations were made on a conventional aircraft of the NC 701 type. First results show the persistence of germs at an altitude of 6700 m. Their number decreases with increasing altitude. F.R.L.

## A67-41073

HEMATOLOGICAL ADAPTATION TO ALTITUDE - STUDIES OF AERONAUTICAL MEDICINE AND STUDIES CARRIED OUT AT THE JUNG-FRAUJOCH AND PIC DU MIDI OBSERVATORIES [L'ADAPTATION HEMATOLOGIQUE A L'ALTITUDE - RECHERCHES DE MEDICINE AERONAUTIQUE ET DES OBSERVATOIRES DU JUNG-FRAUJOCH ET DU PIC DU MIDI].

G. Ringenbach.

*Revue de Médecine Aéronautique et Spatiale*, vol. 6, 1st Quarter, 1967, p. 29-31. 14 refs. In French.

Review of various complications of the blood arising from long-continued stays at high altitude. These may include thromboses and hemorrhages of the nervous centers, cardiac insufficiency, and syncope. A study of the inequality of distribution of red blood corpuscles by means of cell counts in venous and capillary blood was made on 45 subjects of varying ages. The distribution of red corpuscles was found to vary when simultaneous count of venous or capillary blood was made. This inequality of red corpuscle distribution can be considered as a hematological criterion of mountain sickness. F.R.L.

## A67-41074

DANGERS TO THE SST PRESENTED BY HEAVY IONS OF PRIMARY COSMIC RADIATION [DANGERS PRESENTES PAR LES IONS LOURDS DU RAYONNEMENT COSMIQUE PRIMAIRE POUR LES T.S.S.].

A. Pfister and R. Delahaye.

*Revue de Médecine Aéronautique et Spatiale*, vol. 6, 1st Quarter, 1967, p. 33, 34. In French.

Consideration of the radiobiological risk of flights at altitudes between 20,000 and 30,000 m. The danger, if it exists, arises from a minimum component of the radiation consisting of heavy particles of which the Z is between 6 and 26 or more. These heavy ions (1 to 3% of the primary cosmic radiation) are so energetic that they are responsible for 85% of the total biological effectiveness of the radiation. Possible methods of detection of this radiation are suggested. F.R.L.

## A67-41080 \*

HUMAN CEREBROVASCULAR RESPONSE TO COMBINED HYPOXIA AND HYPERCAPNIA.

William Shapiro, Albert J. Wasserman, and John L. Patterson, Jr. (Virginia, Medical College, Dept. of Medicine, Richmond, Va.). (American Heart Association, Scientific Session, 38th, Bal Harbour, Fla., Oct. 16, 1965, Paper.)

*Circulation Research*, vol. 19, Nov. 1966, p. 903-910. 22 refs. PHS Grant No. FR-0001602; Grant No. NSG-156-61.

The N<sub>2</sub>O technique was used in six human subjects to measure cerebral blood flow and metabolism during hypoxia and hypercapnia induced by the inhalation of 10% O<sub>2</sub>-5% CO<sub>2</sub>. Ventilation increased from 7.7 to 46.3 liters/min; PaO<sub>2</sub> decreased from 88 to 62 mm Hg; PaCO<sub>2</sub> increased from 38 to 45 mm Hg (for each P < .01). Mean cerebral blood flow increased from 56 to 97 ml per 100 g per minute (P < .01). Because cerebral O<sub>2</sub> consumption was unchanged, the technique of estimating changes in cerebral flow from arterial-jugular venous O<sub>2</sub> differences was used to follow changes during the first 10 min of inhalation of 10% O<sub>2</sub>-5% CO<sub>2</sub> in six additional subjects. The rapidity of cerebral vasodilatation was increased by this combination of stimuli. The enhanced respiratory response produced by breathing 10% O<sub>2</sub>-5% CO<sub>2</sub> appeared responsible for the more rapid cerebrovascular response and may offer some protective benefits. Comparisons of the present data with previous studies lead to the conclusion that simultaneous hypoxia and hypercapnia

have additive dilator effects on the cerebral vasculature. Thus, the observed increases in cerebral flow were the sum of their individual effects. (Author)

#### A67-41087 \*

##### A RELIABLE IN VIVO MEASUREMENT OF BONE-MINERAL CONTENT.

James A. Sorenson and John R. Cameron (Wisconsin, University, Dept. of Radiology, Madison, Wis.).  
*Journal of Bone and Joint Surgery*, vol. 49A, Apr. 1967, p. 481-497. 13 refs.

AEC Contract No. AT (11-1)-1422; Grant No. NGR-50-002-051.

Development of a technique for determining bone-mineral content in vivo from photon-beam-transmission measurements. The technique is accurate and reproducible at the 2% level and has been used to observe changes in mineral content of a magnitude undetectable by any other in vivo technique. Bone-mineral content is determined by measuring the transmission of a monoenergetic photon beam through the sample with a scintillation detector. The effects of soft tissue overlying the bone are accounted for. The technique has been used to observe bone-mineral-content changes of as little as 6% over a six-month period. R. B. S.

#### A67-41346 \*

##### SURVIVAL OF DESERT SOIL ALGAE AT EXTREMELY LOW TEMPERATURES.

R. E. Cameron (California Institute of Technology, Jet Propulsion Laboratory, Space Science Div., Bioscience Section, Pasadena, Calif.) and Gerald B. Blank (California Institute of Technology, Jet Propulsion Laboratory, Space Science Div., Chemistry Section, Pasadena, Calif.).

*Cryogenic Technology*, vol. 3, July-Aug. 1967, p. 151-156. 14 refs.

Algae in an air-dry sandy soil from the Colorado Desert of California were subjected to continuous freezing at -79 and -195°C, and to diurnal freeze-thaw cycles of -79 to +22°C and -195 to +22°C. Following these treatments the algae in the soil were cultured in salt plus soil extract solution. All of the indigenous algae survived and were able to grow and reproduce. Growth was obtained more rapidly in aqueous cultures of low dilutions of soil than at high dilutions, in sieved rather than powdered soil samples, and after subjection to freeze-thaw cycles rather than to continuous freezing. (Author)

#### A67-41534

##### AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM.

Washington, D.C., American Medical Association, 1967. 338 p. Abridged.

Members, \$5.00; nonmembers, \$8.00.

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THE RELATIONSHIP OF AGE AND EXPERIENCE TO JOB PERFORMANCE RATINGS OF AIR ROUTE TRAFFIC CONTROLLERS. Bart B. Cobb (Federal Aviation Administration, Oklahoma City, Okla.), p. 254, 255.

RELATIONSHIP BETWEEN ENERGY-DENSITY OF A FOCUSED RUBY LASER BEAM AND THE PATHOLOGIC LESION PRODUCED. R. W. Ebberts, J. R. Princ, and T. L. Rodriguez (USAF, Systems Command, Holloman AFB, N. Mex.), p. 256, 257.

RELATIVE EFFECTIVENESS OF SELECTED SPACE FLIGHT DECONDITIONING COUNTERMEASURES. Michael McCally and Spencer Shropshire, Jr. (USAF, Systems Command, Wright-Patterson AFB, Ohio), p. 258.

RENIN SECRETION DURING  $+G_z$  ACCELERATION. J. D. Rogge, A. F. Fasola, and B. L. Martz (USAF, Systems Command, Brooks AFB, Tex.; Marion County General Hospital, Indianapolis, Ind.), p. 259, 260. [See A67-41634 23-04]

RESPONSE OF SQUIRREL MONKEYS TO HYPEROXYGENATION PRIOR TO AND DURING HIGH G, LONG DURATION ACCELERATION. Bruce W. Pince and Jeffry S. Life (Space/Defense Corp., Birmingham, Mich.), p. 261, 262. 12 refs. [See A67-41635 23-04]

RESPONSE OF THE PHARMACOLOGICALLY DENERVATED HEART TO ACCELERATIVE STRESS. Jeffry S. Life and Bruce W. Pince (Space/Defense Corp., Birmingham, Mich.), p. 263, 264. [See A67-41636 23-04]

THE RESTORATION OF CARDIOVASCULAR INTEGRITY IN POST MYOCARDIALLY-INFARCTED AVIATION PERSONNEL. M. T. Lategola and J. Naughton (Federal Aviation Administration, Washington, D.C.; Oklahoma, University, Oklahoma City, Okla.), p. 265, 266. [See A67-41637 23-04]

RETINAL CIRCULATION IN MAN DURING  $+G_z$  ACCELERATION. S. D. Leverett, Jr., V. E. Kirkland, T. J. Schermerhorn, and W. A. Newsom (USAF, Systems Command, Brooks AFB, Tex.), p. 267, 268. [See A67-41638 23-04]

RETINAL FLUORESCENCE ANGIOGRAPHY DURING BLACK-OUT ON THE HUMAN CENTRIFUGE. W. A. Newsom, V. E. Kirkland, S. D. Leverett, Jr., and T. J. Schermerhorn (USAF, Systems Command, Brooks AFB, Tex.), p. 269, 270. [See A67-41639 23-04]

SAFETY MONITORING INSTRUMENTATION FOR THE LUNAR MODULE INTERNAL ENVIRONMENT SIMULATOR. C. R. Belensky, H. Wajsgas (Grumman Aircraft Engineering Corp., Bethpage, N.Y.), and J. Rampack (Spacelabs, Inc., Van Nuys, Calif.), p. 271, 272. [See A67-41640 23-05]

A SEVEN YEAR FOLLOW-UP X-RAY SURVEY FOR BONE CHANGES IN LOW PRESSURE CHAMBER OPERATORS. C. J. Hodgson, J. C. Davis, C. L. Randolph, Jr., and G. H. Chambers (USAF, Systems Command, Brooks AFB; USAF, Systems Command, Lackland AFB, Tex.), p. 273, 274. 5 refs. [See A67-41641 23-04]

SIGNIFICANT DIFFERENCES (BOTH QUALITATIVE AND QUANTITATIVE) IN MICROBIAL LEVELS IN CLOSED ENVIRONMENTS. Phyllis E. Riely (Pall Corp., Glen Cove, N.Y.), Alton E. Prince (USAF, Systems Command, Wright-Patterson AFB, Ohio), James D. Gatts (Fairchild Hiller Corp., Farmingdale, N.Y.), and Diane Shorenstein (International Business Machines Corp., Bethesda Md.), p. 275, 276. [See A67-41642 23-04]

THE SIGNIFICANCE OF PREMATURE VENTRICULAR CONTRACTIONS - A FIVE YEAR FOLLOW-UP STUDY OF 900 INDIVIDUALS. Norman L. Berkman (USAF, Systems Command, Brooks AFB, Tex.), p. 277.

SIZE MATCHING ACCURACY UNDER VERY HIGH TARGET LUMINANCES. Richard F. Haines (NASA, Ames Research Center, Moffett Field, Calif.), p. 278, 279. 14 refs. [See A67-41643 23-05]

SKIN RESPONSE OF THE RAT TO 13 MEV PROTON IRRADIATION. I. J. E. Prince, B. L. Caraway, D. K. Hinkle (USAF, Systems Command, Brooks AFB, Tex.), M. D. Harris, Jr. (USAF, Systems Command, Kirtland AFB, N. Mex.), and Ira L. Morgan (Texas Nuclear Corp., Austin, Tex.), p. 280, 281. [See A67-41644 23-04]

SKIN RESPONSE OF THE RAT TO 13 MEV PROTON IRRADIATION. II. H. W. Casey, D. K. Hinkle, J. E. Prince, B. L. Caraway, and W. T. Williams (USAF, Washington, D.C.), p. 282, 283. [See A67-41645 23-04]

SOME RESULTS OF USING HELIUM AS THE SPACE CABIN ATMOSPHERE DILUENT. J. G. Gaume and C. R. Adams (McDonnell Douglas Corp., Huntington Beach, Calif.), p. 284, 285. [See A67-41646 23-05]

STUDIES ON AN ADVANCED PASSIVELY PRESSURIZING PARTIAL PRESSURE SUIT. Jefferson C. Davis, Frederick R. Ritzinger, Jr., and Larry E. Noble (USAF, Systems Command, Brooks AFB, Tex.), p. 286, 287. [See A67-41647 23-05]

THE SUCCESS OF THE PILOT/FLIGHT OFFICER TRANSFER OPTION IN NAVAL AVIATION. J. F. Funaro, F. E. Peterson, and R. K. Ambler (U.S. Naval Aviation Medical Center, Pensacola, Fla.), p. 288.

SULFHYDRYL PROTECTION IN RATS EXPOSED TO FRACTIONATED ACUTE DOSES OF X- AND GAMMA RADIATION. George S. Melville, Jr. and Arthur E. Gass, Jr. (USAF, Systems Command, Brooks AFB, Tex.), p. 289, 290. [See A67-41648 23-04]

SURVIVAL OF RATS EXPOSED TO 10 PSIA OXYGEN TO FURTHER EXPOSURE AT ONE ATMOSPHERE OXYGEN. George H. Kydd (U.S. Naval Material Command, Naval Air Development Center, Johnsville, Pa.), p. 291, 292. [See A67-41649 23-04]

A SURVIVAL STUDY OF A MODERN COMMERCIAL JET AIRCRAFT (BOEING 727) LANDING ACCIDENT WITH SUBSEQUENT INTERIOR FIRE. II. Clyde C. Snow, Ernest B. McFadden (Federal Aviation Administration, Oklahoma City, Okla.), and C. Hayden LeRoy (Civil Aeronautics Board, Washington, D.C.), p. 293, 294. [See A67-41650 23-05]

A TELEMETRY SYSTEM FOR PHYSIOLOGICAL EVALUATION OF SPACE SUITS. D. A. Ratino, A. Marko, and W. C. Kaufman (USAF, Systems Command, Wright-Patterson AFB, Ohio), p. 295. [See A67-41651 23-05]

A THERMAL THEORY OF LASER INDUCED RETINAL DAMAGE. Jude R. Hayes and Myron Wolbarsht (National Naval Medical Center, Bethesda, Md.), p. 296, 297.

TOLERANCE TO LONG DURATION  $G_x$  ACCELERATION. W. K. Brown and J. D. Rogge (USAF, Systems Command, Brooks AFB, Tex.), p. 298, 299. [See A67-41652 23-04]

TRANSIENT AND DIFFERING EFFECTS OF IN VIVO HYPEROXIA ON RBC ATP AND MEMBRANE. R. Timms, C. E. Mengel, and B. W. O'Malley (Ohio State University, Columbus, Ohio), p. 300.

TRANSIENT CHANGES IN ARTERIAL OXYGEN TENSION DURING ACCELERATION. D. H. Glaister (Royal Air Force, Farnborough, Hants., England), p. 301, 302. 6 refs. [See A67-41653 23-04]

ULTRASTRUCTURAL CHANGES IN RAT KIDNEY UNDER 100% OXYGEN - EFFECTS OF VITAMIN E DEPLETION. D. B. Menzel, R. Hess, A. M. Shaw (California, University, Los Angeles, Calif.),

and G. A. Brooksby (NASA, Ames Research Center, Moffett Field, Calif.), p. 303, 304. [See A67-41654 23-04]

UNDERCOOLING AND OVERCOOLING WITH LIQUID COOLING GARMENTS. James F. Annis and Paul Webb (Webb Associates, Yellow Springs, Ohio), p. 305, 306. [See A67-41655 23-05]

UNUSUAL ASPECTS OF INDIGENOUS MICROFLORA AS DETERMINED IN MEN UNDERGOING SIMULATED SPACE CONDITIONS. Diane Shorenstein, Phyllis E. Riely, James D. Gatts (Fairchild Hiller Corp., Farmingdale, N.Y.), and Alton E. Prince (USAF, Systems Command, Wright-Patterson AFB, Ohio), p. 307, 308. [See A67-41656 23-04]

THE USE OF SIMPLE PHYSIOLOGICAL MEASUREMENTS IN OBTAINING RELATIVE ENERGY EXPENDITURE AND WORKLOADS DURING A SIMULATED LUNAR SURFACE MISSION. John E. Haaland (Honeywell, Inc., Minneapolis, Minn.), p. 309, 310. [See A67-41657 23-04]

VEHICLE VOLUME AND DESIGN CRITERIA FOR MANNED LUNAR ROVING VEHICLES. Neal M. Burns, Lorenz P. Schrenk, and John E. Haaland (Honeywell, Inc., Minneapolis, Minn.), p. 311. [See A67-41658 23-05]

VESTIBULARLY DRIVEN HEAD MOVEMENTS IN MAN. G. Melvill Jones (McGill University, Montreal, Canada) and J. S. Outerbridge, p. 312, 313. [See A67-41659 23-04]

THE VIBROCARDIOGRAM AS A CARDIOVASCULAR MONITOR. Clarence M. Agrest and Stanley Wegner (Cedars-Sinai Medical Research Institute, Los Angeles, Calif.), p. 314, 315. [See A67-41660 23-04]

VIBROPHONOCARDIOGRAPH INVESTIGATION AND DEVELOPMENT STUDY. D. M. Walton, P. R. Barker, L. N. Wright, R. L. Randall, and J. T. Celentano (North American Aviation, Inc., El Segundo, Calif.), p. 316, 317. [See A67-41661 23-05]

WORK PHYSIOLOGICAL ELEMENTS IN THE ANALYSIS OF THE WORK POTENTIAL OF MAN. W. Kuehnegger (Kaman Work Sciences Laboratory), p. 318-320. [See A67-41662 23-04]

THE WORK-REST CYCLE IN AIRCREWMEN FATIGUE. Roy L. DeHart (USAF, Logistics Command, Wright-Patterson AFB, Ohio), p. 321, 322. [See A67-41663 23-04]

#### A67-41535 \* #

ABDOMINAL BLOOD FLOW IN ANESTHETIZED DOGS DURING  $+G_x$  ACCELERATION.

H. L. Stone, B. Wiggins, Jr., and J. H. Hux (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 1, 2. Abridged.

NASA-supported research.

Investigation of the changes in abdominal blood flow as the axis between the body and the acceleration vector is changed from the horizontal plane to a plane inclined  $30^\circ$  toward the vertical. Nine adult mongrel dogs ranging from 13 to 18 kg in body weight were used in the study. The major change observed during transverse acceleration ( $+G_x$ ) is a decline in tissue blood flow in the renal cortex, adrenal gland, and small intestines.

B. B.

#### A67-41536 #

ABSORPTION OF GASES FROM THE ANTERIOR CHAMBER OF THE EYE - AEROMEDICAL IMPLICATIONS.

Torrence A. Makley, Jr. and Charles E. Billings (Ohio State University, Dept. of Ophthalmology and Dept. of Preventive Medicine, Columbus, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 3, 4. Abridged.

Study of the absorption of various gases after injection into the anterior chamber of the mammalian eye. The findings of an analysis in which regression equations for nitrogen and oxygen are combined on the basis of the fractional concentrations of each gas in air are plotted. The predicted absorption equation for air is found to differ insignificantly from the calculated regression for air bubbles injected as controls.

B. B.

## A67-41537

### A67-41537 #

ADAPTATION OF DOGS TO 60 AND 90 MM. Hg CO<sub>2</sub> AT A TOTAL PRESSURE OF 260 MM. Hg.  
W. E. Pepelko (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 5, 6. 6 refs. Abridged.

Determination of the arterial pH and bicarbonate changes resulting in dogs chronically exposed to increased CO<sub>2</sub> levels in a normoxic environment. Values indicating the effects of chronic exposure of the dogs to 60 or 90 mm Hg PCO<sub>2</sub> at a total pressure of 260 mm Hg with 70% oxygen on arterial pH, PCO<sub>2</sub>, and standard bicarbonate are plotted. B.B.

### A67-41538 #

ADAPTATION TO INCREASED OXYGEN TENSION AT AMBIENT PRESSURES.  
R. T. Houlihan, John Zavodni, and Morton Cross (Pennsylvania State University, Dept. of Zoology, University Park, Pa.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 7, 8. Abridged.  
Contract No. NR-102-645.

Experimental investigation of the adrenal-gland response in rats subjected to either a 100% O<sub>2</sub> environment or to a 66% O<sub>2</sub>-34% N<sub>2</sub> environment. A comparison was made between the lethal environment and the 66% O<sub>2</sub>. The results obtained support the concept of Brooks et al. that there is a critical threshold level for the partial pressure of oxygen. Above this level it seems that animals cannot adapt. Even more relevant is the fact that, once this level is exceeded, the animal responds by increasing its adrenal output, which adds to the deleterious effects of oxygen. Thus the animal dies sooner than if the adrenal gland had not been stimulated. M.M.

### A67-41539 #

THE AEROMEDICAL EXAMINER AND HIS RELATIONSHIP TO SAFE AND EFFICIENT FLIGHT.  
Joseph D. Caldara.  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 9, 10. Abridged.

Discussion of the relationship of the aeromedical examiner to safe and efficient flight. The aeromedical examiner is burdened with the responsibility for the fledgling pilot, with administrative workload, and whatever other action should be taken in order to get the pilot-to-be off to the best start. A standardization of the psychological approach to the medical examination is mandatory if all examiners are to deny a student pilot's license on the basis of a possibility that the student would have an accident. The problem of supplying every aeromedical examiner with realistic, interesting, and effective publications on safe and efficient flight is considered. M.M.

### A67-41540 #

AEROMEDICAL INCIDENTS AMONGST CANADIAN FORCES PILOTS - A SURVEY.  
J. R. Smiley (Institute of Aviation Medicine, Toronto, Canada).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 11, 12. Abridged.

Description of a limited survey of Canadian Air Force pilots during early 1966 to determine the extent of their experience with aeromedical incidents. The mailed questionnaire method was used; information relating to drug usage, flying with a hangover, hemorrhoids, and use of the services of a flight surgeon was also collected. B.B.

### A67-41541 \* #

AEROMEDICAL MONITORING OF NAVAL AVIATORS DURING AIRCRAFT CARRIER COMBAT OPERATION - A PRELIMINARY REPORT.

Frank H. Austin, Jr. (U.S. Navy, Bureau of Medicine and Surgery, Aerospace Medical Flight Safety Branch, Washington, D.C.), Thomas J. Gallagher (U.S. Navy, Bureau of Medicine and Surgery, Washington, D.C.), Charles E. Lewis, Jr. (NASA, Flight Research Center, Edwards AFB, Calif.), B. David Polis (U.S. Naval Material Command, Naval Air Development Center, Aerospace Medical Research Dept., Johnsville, Pa.), and D. E. Furry (National Naval Medical Center, Naval Medical Research Institute, Bethesda, Md.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 13-15. 13 refs. Abridged.  
Navy-supported research; Contract No. NASw-1467.

Discussion of the feasibility of performing in-flight monitoring of the cardiorespiratory response of pilots during combat missions. Data are gathered from 32 aviators flying attack missions in three types of aircraft, principally in the A4 Skyhawk, the monitoring period extending from the 86th to the 108th day of line combat operations. The experiment attempts to determine the immediate physiological effects of a single combat flight, and the cumulative effects of continual exposure to the rigors and risk of combat flying. B.B.

### A67-41542 #

AN AEROSPACE WORD LIST FOR SPEECH DISCRIMINATION TESTING.

F. W. Fascenelli (Palo Alto-Stanford Hospital, Div. of Otolaryngology, Palo Alto, Calif.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 16, 17. Abridged.

Appraisal of the ability of aircrew members to hear well enough to perform their duty while screening against the possibility of serious underlying disease. It is decided that authorized in-flight tests should continue being used, but should employ a standardized special vocabulary that can be stored and compared throughout the aerospace industry. B.B.

### A67-41543 #

AIRCRAFT OXYGEN SYSTEMS - THE NEXT GENERATION.  
G. L. Mrava and R. A. Wynveen (TRW, Inc., TRW Equipment Laboratories, Cleveland, Ohio).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 18, 19. Abridged.

Study of four systems for the onboard generation of oxygen. Oxygen concentration systems using alkaline, acid, and solid electrolyte are discussed, and an electrolysis cell system using alkaline electrolyte is considered. The alkaline concentrator appears to be superior to the acid and solid units, due to reduced material constraints. B.B.

**A67-41544 #****AIRSICKNESS AND ANXIETY.**

Gary J. Tucker (Yale University, Dept. of Psychiatry, New Haven, Conn.) and Roger F. Reinhardt (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 20, 21. Abridged.

Determination as to whether airsick pilot trainees experience and describe higher levels of anxiety and have higher attrition potentials. Students with mild airsickness early in flight training are seen to have a significantly higher attrition rate than students having no airsickness during this period; they also experience more subjective anxiety, more autonomic symptoms, and lower motivation than their nonairsick colleagues.

B. B.

**A67-41545 #****ALTITUDE DECOMPRESSION SICKNESS - CURRENT CONCEPTS IN TERMINOLOGY, PATHOPHYSIOLOGY AND TREATMENT.**

Frederick R. Ritzinger, Jr. and Jefferson C. Davis (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Aeromedical Indoctrination Branch, Brooks AFB, Tex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 22, 23. Abridged.

Discussion of the terminological, pathophysiological, and clinical aspects of altitude decompression sickness. Manifestations, prevention, and treatment of this condition are considered, noting the successful use of compression to greater than 1 atm abs as a remedy, even though the exact mechanisms of the etiology of the sickness are still undetermined.

V. Z.

**A67-41546 #****ANALYSIS OF SAFETY AND SURVIVAL FACTORS IN EMERGENCY ESCAPE. I.**

L. Carlyle (McDonnell Douglas Corp., Douglas Aircraft Co., Long Beach, Calif.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 24. Abridged.

Study of the qualitative survival factors in emergency escape and their relationship to the complete ejection event. The pre-ejection, ejection, landing, and postlanding factors are discussed. It is pointed out that the psychophysiological factors acting on the pilot must be determined to evaluate properly his ability to assess the emergency and make his decision to eject or not. The analysis of postlanding events requires knowledge of both the landing site and the survival equipment.

M. F.

**A67-41547 #****ANALYSIS OF SAFETY AND SURVIVAL FACTORS IN EMERGENCY ESCAPE. II.**

P. J. Stinson (McDonnell Douglas Corp., Douglas Aircraft Co., Long Beach, Calif.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 25, 26. Abridged.

Discussion of a technique for measuring the degree of safety inherent in the escape system of an aircraft. The model, or performance-capability measure, is applied to a subsystem, the escape system of an A-4, to determine the probability of failure under varying human and environmental conditions. System effectiveness

is defined as the probability of mission completion within allowable error tolerances. The parameters influencing system-effectiveness measure are considered.

M. F.

**A67-41548 #****AUTOMATIC BIOMEDICAL MONITORING.**

Paul E. Hoffman (USAF, Systems Command, National Range Div., Eastern Test Range, Patrick AFB, Fla.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 27, 28. Abridged.

Description of an automatic biomedical monitoring system, the Bioastronautics Laboratory Research Tool (BIO-ALERT). This system is composed of a digital computer, analog-to-digital and digital-to-analog converters, and a variety of input and output devices. The complex is linked to a telemetry station. It is pointed out that digital telemetry is the primary method of input and that all data are processed in digital form. Control programs and data display are reviewed.

M. F.

**A67-41549 \* #****THE BEHAVIOR OF SMALL ANIMALS IN FIELDS OF SIMULATED GRAVITY.**

A. B. Broderson and K. O. Lange (Kentucky, University, Engineering Experiment Station, Wenner-Gren Aeronautical Research Laboratory, Lexington, Ky.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 29, 30. Abridged.

Grant No. NSG-456.

Study of the behavior of earth organisms under artificial gravity. Long-term orbital experiments in which rodents and small primates are given the opportunity to manipulate the parameters of space centrifuges over extended periods of time were carried out. Methods of determining preference for a certain level or levels of "gravity" are explained.

M. F.

**A67-41550 #****BLOOD GLUCOSE DURING FLIGHT IN HIGH PERFORMANCE AIRCRAFT.**

Jerry F. Meyer (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Biodynamics Branch, Brooks AFB, Tex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 31, 32. Abridged.

Study of the effect of flight on the blood glucose in fasting subjects. The methods and materials used in the experiment are described. The study showed no tendency of fasting subjects toward hypoglycemia during high-performance aircraft flight and no consistent effect of the flights on the blood sugar, but does not exclude significant effects under other conditions of flight.

M. F.

**A67-41551 #****BLOOD PRESSURE, BLOOD VELOCITY, AND PRESSURE WAVES DURING POSITIVE  $G_z$  ACCELERATION.**

R. M. Olson (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 33, 34. Abridged.

## A67-41552

Discussion of a method which seems promising as a tool to study cardiovascular acceleration-stress reactions. It is shown that pressure recordings taken simultaneously from several aortic sites produce data from which other information can be derived. This method of analysis is shown to be feasible in studying the effects of acceleration produced by centrifugation. Particular attention is given to the application of this method to a study of the control and +2G<sub>z</sub> stressed state. M. F.

## A67-41552 #

CARDIOVASCULAR DYNAMICS AND CARDIAC DISPLACEMENT DURING ABRUPT DECELERATION OF DOGS.  
P. G. Hanson (USAF, Systems Command, Aerospace Medical Div., Aeromedical Research Laboratory, Holloman AFB, N. Mex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 35, 36. Abridged.

Description of experiments designed to study the dynamic responses of the canine cardiovascular system during and after -G<sub>z</sub> impact. Several mechanisms are proposed to explain traumatic ruptures of the aortic arch during accidental exposure to impact. These include: (1) pressure rupture due to "hydraulic ram" or rapid tamponade of the blood mass within the aorta; and (2) shearing or tearing of the aorta and thoracic arterial branches due to inertial displacement of the heart and associated visceral attachments. The data presented show that both increased intravascular pressure and severe inertial displacement of the heart may act to produce vascular ruptures during -G<sub>z</sub> impact. M. F.

## A67-41553 #

CINERADIOGRAPHIC ANALYSIS OF HUMAN VISCERAL RESPONSES TO SHORT DURATION IMPACT.  
E. B. Weis, Jr. and G. C. Mohr (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 43, 44. Abridged.

Discussion of the application of a newly developed X-ray unit to the study of visceral responses to impulsive acceleration excitation in humans. Specifically, 16 subjects were exposed to triangular deceleration pulses and successive radiographic images obtained during the impulse. These radiographs were studied, and a preliminary analysis of the results is made. The radiographic findings correspond rather well with the results of experiments on monkeys exposed to short-duration impacts. Some implications of the motion results are discussed in terms of organ sensitivities to velocity change. M. F.

## A67-41554 \* #

CIRCADIAN OSCILLATIONS OF DEEP BODY TEMPERATURE AND HEART RATE IN A PRIMATE (CEBUS ALBAFRONS).  
C. M. Winget (NASA, Ames Research Center, Moffett Field, Calif.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 45, 46. 7 refs. Abridged.

Quantitative description of two daily rhythms in an ambulatory primate maintained in a controlled environment with 12 hr of light and 12 hr of darkness. Evidence is presented for the existence of 24-hr rhythms of deep body temperature and heart rate in the primate. The periodogram and correlogram were used to quantitatively establish the biorhythms. A statistically significant 8-hr rhythm was present in the data. Difference equations for a family of functions related to the Volterra integral equations and the highly significant 24-hr harmonic were fitted to the data. The

results indicate that light is the primary circadian phase setter of the effector systems evaluated. The heat-loss mechanism is probably responsible for the circadian frequency of the deep body-temperature data. M. F.

## A67-41555 \* #

CO<sub>2</sub> REMOVAL BY PULSED GAS CHROMATOGRAPHY.  
Eugene Findl and Kenneth Lui (Electro-Optical Systems, Inc., Pasadena, Calif.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 47, 48. Abridged.  
Contract No. NAS 2-3209.

Study of physicochemical techniques to solve the problem of gas separation, with particular attention to a technique related to physical adsorption phenomena. The components of the system and their function are outlined. The technique of pulsed gas chromatography for the removal of gas is shown to be satisfactory. Analysis of the initial test results indicated that pumpdown between cycles was the controlling parameter. Preliminary design estimates were made, using a pulsed gas-chromatography system for air/CO<sub>2</sub> separation in a four-man spacecraft. M. F.

## A67-41556 =

COCKPIT NOISE LEVELS OF AIRLINE AIRCRAFT.  
Richard B. Stone.  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 49, 50. Abridged.

Discussion of cockpit noise levels in twelve different types of aircraft in current use by airlines. Very significant differences exist between the three categories of aircraft studied. The reciprocating-engine propeller aircraft have most of their acoustical energy concentrated in the lower frequencies. To a lesser extent, the same is true of the turbine-powered propeller aircraft. This is due to the disturbance and noise associated with the propeller. The jet with its turbine engine shows little noise in the lower frequencies. Maximum noise inside the cockpit occurs during descent, while the aircraft is at its maximum normal operating speed. M. F.

## A67-41557 #

A COMPARISON OF THE EFFECTS OF VASOPRESSIN AND POSITIVE PRESSURE BREATHING ON THE CARDIOVASCULAR DECONDITIONING OF WATER IMMERSION.  
Noel C. Hunt, III (Duke University, Medical Center, Durham, N.C.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 52, 53. Abridged.

Experimental study designed to compare in dehydrated subjects the separate effects of inactivity and head-out water immersion on fluid balance and tilt-table performance and to assess the effects of vasopressin and positive pressure breathing on the changes in fluid volume and tilt-table performance resulting from water immersion. The experiment indicated that short-term inactivity and recumbency results in a slight diuresis, but no significant change in tilt-table results. M. F.

## A67-41558 #

CONDUCTIVE COOLING - EFFECTS ON PHYSIOLOGICAL PARAMETERS DURING EXERCISE.  
Raymond J. Hock and Keith Dart (Northrop Corp., Northrop Nortronics, Northrop Systems Laboratories, Palos Verdes Peninsula, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 54, 55. Abridged.

Discussion of the use of a conductive-cooling method for pressure applications to replace the convective-ventilation method used at present. Conductive cooling is found to be a promising method of promoting heat loss from the body at high exercise rates. With only 10% of the body surface covered, 10% or more of the increased heat production of exercise was removed. More heat can be removed by greater coverage, decreased coolant temperature, or insulation of the hoses.

M. F.

#### A67-41559 \* #

CONTAMINANT CONCENTRATIONS IN A SPACE CABIN SIMULATOR AT 258 mm Hg.

J. P. Conkle, J. D. Adams, W. E. Mabson, P. H. Wolf, B. E. Welch (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.), and H. J. Zeft (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.; Duke University, Medical Center, Durham, N.C.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 58, 59. Abridged.

NASA Contract No. R-89.

Study designed to define within the limits of the analytical procedures the contaminants resulting from human habitation of a sealed environment in an essentially oxygen atmosphere at 258 mm Hg total pressure. The 142 compounds reported during the 28-day experiment at 258 mm Hg are tabulated. Of these, 66 were reported for the 258-mm-Hg experiment that were not reported in a previous 760-mm-Hg experiment. Explanations for the inconsistency of the data obtained are given.

M. F.

#### A67-41560 #

CONTINUOUS EKG RECORDING DURING FREE-FALL PARACHUTING.

W. P. Schane (U.S. Army, Aeromedical Research Unit).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 60, 61. Abridged.

Determination of the heart rate and rhythm of experienced parachutists during free-fall and in the periods immediately before and after the jump. Twenty nine subjects made 98 individual exits from aircraft in flight. All were trained athletes. Their ages ranged from 17 to 47 years. They were all free of acute illness, and none had clinical evidence of cardiovascular disease. Enough subjects were used so that some inferences can be made regarding the population of parachutists. Tachycardia was a constant finding and must be considered a normal response to free-fall parachuting.

P. v. T.

#### A67-41561 #

THE CONTROL OF HUMAN HEART RATE UNDER SINUSOIDAL GRAVITATIONAL FIELD STIMULATION.

Samuel T. Lim and John Fletcher (Webb Associates, Yellow Springs, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967, ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 62, 63. Abridged.

Contract No. AF 41(609)-2897.

Study of the circulatory response to sinusoidal gravitational stimulus by means of a Rotational Flight Simulator (RFS). Seven volunteer subjects were used in the experiments performed. Roll and pitch were tested at constant rates, ranging from 1.5 rpm to 16 rpm, where the center of rotation was through the iliac crest. The radial acceleration gradient at neck level was 0.2 g at 16 rpm. The duration of each rotation was 3 min, and data were recorded continuously. Random rotation was also checked. Generally, the heart rate variation was more pronounced at the first few rotational cycles. To study the remainder of the response, the instantaneous heart rate responses for each rotation were superimposed one over the other from cycle to cycle.

P. v. T.

#### A67-41562 \* #

CONTROLLED COOLING DURING HIGH RATES OF WORK.

Paul Webb and James F. Annis (Webb Associates, Yellow Springs, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 64, 65. Abridged.

Contract No. NASw-1306.

Study of energy expenditure in current space suits (noting its high level during extravehicular activity). The astronaut is thermally isolated in a suit which has small thermal mass. During rapid changes in heat production in the confines of the suit there must be equally rapid and properly matched changes in cooling to prevent sweating, chilling, or heat storage. The extremely effective heat removal of water cooled garments means that control of cooling is the problem. Results are given of a series of experiments with various schedules of activity - including high rates of work during which cooling was carefully controlled so that the subjects were kept comfortable (neutral, thermally balanced). The subjects did not sweat nor were they chilled. The relationship between the oxygen consumption and the temperature of the water entering the suit is defined by the results of the experiments.

P. v. T.

#### A67-41563 #

DETERMINATION OF CARDIAC OUTPUT IN MAN BY MEANS OF IMPEDANCE PLETHYSMOGRAPHY.

A. Harley and J. C. Greenfield (Duke University, Dept. of Medicine, Durham, N.C.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 70. Abridged.

Evaluation of impedance plethysmography as an atraumatic method of estimating cardiac output in man. Simultaneous indicator dilution curves (Dye) and impedance records (Imp) were obtained in 13 healthy male subjects before and after intravenous infusion of isoproterenol. Cardiac output was also measured simultaneously by Dye and Imp in 24 patients. Simultaneous measurements of dilution curves and impedance records before and after isoproterenol in the 13 subjects gave 26 paired values for cardiac output. The resulting regression equation was  $\text{Imp} = 2.93 + 0.86 \text{ Dye L/min}$ , with a correlation coefficient of  $r = 0.68$ . In the 24 patients reasonable correlation was found by inspection. All values except four fell within the standard confidence limits derived from the normal subjects.

P. v. T.

#### A67-41564 #

THE DEVELOPMENT OF AN EMERGENCY DENTAL KIT FOR PROLONGED SPACE FLIGHT.

J. L. Hartley (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Dental Sciences Div., Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 71. Abridged.

## A67-41565

Description of an emergency dental kit to be used on extra-terrestrial missions for treatment of dental disorders and traumatic episodes. A high-impact material, Union Carbide "Bakelite" rubber-modified styrene extrusion type, was found to be the material of choice as the filler for the kit. Consideration had to be given to the moldability of the material and its suitability for self-care. Six kits with special instruments have been developed and will be employed for training purposes. P.v.T.

## A67-41565 #

DIPLOLE SHUTTER - EYE PROTECTION TRANSPARENCY INTERIM REPORT.  
John A. Carpenter and Wendell R. Peters (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 74, 75. Abridged.  
DASA-sponsored research.

Description of an improved dipole shutter, an ophthalmic transparency for protection against high-intensity flashes. In order to attain this improvement over an earlier model which was not sufficiently stable for routine usage, an in-house research project to ascertain the effect of forced closure and to formulate design criteria for test cells was undertaken. Two major cell configurations were examined in order to note the effect of cell forced closure. These were the parallel grid and the orthogonal grid. The orthogonal grid was additionally subdivided into a grid of wires and one of chromium electrodes. Whether or not this improvement will eventually provide closure times on the order of 150  $\mu$ sec as required is difficult to envision. Further improvements can be expected. P.v.T.

## A67-41566 #

THE EFFECTS OF ACETAZOLAMIDE ON PHYSIOLOGIC AND SUBJECTIVE RESPONSES OF MEN TO 24 HOURS AT 14,000 FEET.  
Richard S. Kronenberg and Stephen M. Cain (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Branch, Brooks AFB, Tex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 81, 82. Abridged.

Exploration of the usefulness of acetazolamide in aiding accommodation to altitude and to examine the mechanism of its action through a study of blood and cerebrospinal fluid (CSF) acid-base balance. A total of 44 experimental subjects were placed in a low-pressure chamber at either 3000 ft (681 torr) or 14,000 ft (447 torr). Each subject consumed either 500 mg of acetazolamide or a lactose placebo in the form of two 250 mg gelatin capsules 12 hr prior to entering the chamber. It is found that acetazolamide significantly lowered both blood and CSF  $\text{HCO}_3^-$  under all conditions. P.v.T.

## A67-41567 #

THE EFFECTS OF CENTRIFUGE RADIUS ON THE PERFORMANCE OF ENTRY TASKS.  
W. C. Middleton and W. J. White (McDonnell Douglas Corp., Douglas Aircraft Co., Missile and Space Systems Div., Huntington Beach, Calif.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 84, 85. Abridged.

Study of the feasibility of including a short-radius centrifuge in a manned space station from both engineering and biomedical points of view. System comparison studies of the penalties for producing artificial gravity show that incorporation of a centrifuge in a space

station is feasible, and is an attractive alternative to station rotation. Tests involving discrete response tasks and tracking tasks for 10 centrifuged subjects are treated. P.v.T.

## A67-41568 \*\*

EFFECTS OF A DEFICIENCY OF VITAMINS A AND E ON RATS EXPOSED TO 100% OXYGEN.  
A. M. Shaw, D. B. Menzel, S. A. Lee, and G. A. Brooksby (California, University, Dept. of Nutritional Sciences, Berkeley; NASA, Ames Research Center, Moffett Field, Calif.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 86, 87. 9 refs. Abridged.  
Grant No. NGR-05-003-090.

Investigation of the requirements of vitamins A and E when rats are exposed to oxygen at 600 mm Hg. The growth and food intake data show that the oxygen-exposed rats all gained less weight and had significantly lower food efficiency ratios than did pair fed air controls, regardless of diet. Comparing food efficiency ratios of exposed groups fed different diets, it appears that addition of vitamin E somewhat facilitates growth. P.v.T.

## A67-41569 #

THE EFFECT OF FLASH BLINDNESS ON THE PERFORMANCE OF NAVAL AVIATORS.  
Roland A. Bosee (U.S. Naval Air Systems Command, Crew Systems Div., Washington, D.C.), James F. Parker, Jr. (BioTechnology, Inc., Arlington, Va.), and Gloria T. Chisum (U.S. Naval Material Command, Naval Air Development Center, Johnsville, Pa.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 88, 89. Abridged.

Study of the temporary loss of vision resulting from exposure to short-duration high-intensity light pulses such as an inadvertent exposure to the light of nuclear bursts. A test apparatus for the investigation of flash blindness effects is described; it utilizes a xenon gas discharge tube and can produce 30 to 60 sec or more of flash blindness. P.v.T.

## A67-41570 #

THE EFFECTS OF HYDRAZINE ON FREE AMINO ACIDS OF PLASMA AND URINE.  
Patricia R. Korty and Fredric L. Coe (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Biosciences Branch, Physiological Chemistry Section, Brooks AFB, Tex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 92, 93. Abridged.

Study of the effects of hydrazine upon the amino acid concentrations of plasma and urine in dogs. Hydrazine was chosen because it is a well studied example of a toxic rocket propellant. It was found that hydrazine produces large increases in plasma amino acid concentrations. The concomitant increase in urinary excretion indicates that depressed renal clearance is not the basis for this phenomenon, and that large amounts are being liberated from cells or from the extracellular fluid volume into the blood. This release could be due to either interference with the mechanisms of transport into cells, metabolic utilization, breakdown of proteins; or conversion of other molecules into amino acids. F.R.L.

**A67-41571 #**

ELECTRODE TECHNIQUES FOR RECORDING HEART RATE CONTINUOUSLY OVER LONG PERIODS OF TIME.

Robert M. Adams, Franklyn K. Coombs, and Philip C. Richardson (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 94, 95. Abridged.

Results of experiments for sensing cardiac activity conducted with lithium chloride "dry" electrodes and surgically implanted electrodes. Lithium chloride impregnated balsa wood electrodes gave satisfactory records for periods of 32 days. Motion-produced artifacts can be minimized. These electrodes have the disadvantage of requiring a chest belt. Fine stainless steel sutures have been used successfully for periods up to 70 days. They were well tolerated and produced acceptable signals for heart rate determination; however, the demonstrated possibility of infection exists.

F.R.L.

**A67-41572 #**

ELEVATED VENOUS PRESSURES DURING EXPOSURE OF DOGS TO NEAR-VACUUM CONDITIONS.

Julian P. Cooke, Stephen M. Cain, and Richard W. Bancroft (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 96, 97. Abridged.

Investigation in dogs of the frequent cases in which venous pressure ( $P_v$ ) appeared to become higher than arterial pressure ( $P_a$ ) when the dogs were decompressed to 1 torr. The study of this inverted arterial/venous pressure relationship was made by first exposing the anesthetized subjects to a near-vacuum condition and then again exposing the same animals following clinical death. Data were then compared. To establish and maintain such a negative pressure differential, compartmentization of the vascular system by constriction or stoppage becomes a prerequisite, and may be associated with vaporization of body fluids and bubble formation, especially in the lungs, right heart, and capillaries.

F.R.L.

**A67-41573 #**

ENERGY REQUIREMENTS IN SIMULATED AEROSPACE ENVIRONMENTS.

B. J. Katchman (Miami Valley Hospital, Dayton, Ohio) and A. L. Prince (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 98, 99. Abridged.

Contract No. AF 33(657)-11716.

Results of a series of experiments designed to determine the water, energy, and protein requirements of man under simulated aerospace conditions. In each experiment four male volunteers were confined either in a controlled activity facility (CAF) or a life support systems evaluator (chamber) for periods from 30 to 60 days. The simulated aerospace conditions included as variables the confined environments, space-type diets, pressurized and unpressurized space suits, 32°C environmental temperature, altitude (10,000 ft), and limited personal hygiene.

F.R.L.

**A67-41574 #**

EVALUATION OF ANIMALS CONTINUOUSLY EXPOSED TO A 5 PSIA PURE OXYGEN ATMOSPHERE FOR EIGHT MONTHS.

H. P. Kaplan, A. A. Thomas, K. C. Back, and F. R. Robinson (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 100, 101. Abridged.

Evaluation of the reactions of mice, rats, monkeys, and dogs exposed to a simulated space-cabin atmosphere of pure oxygen at 5 psia total pressure continuously for 235 days. No evidence of systematic oxygen toxicity was found. It is anticipated that adaptive changes occurring during prolonged exposure to such an atmosphere may necessitate a period of gradual readaptation for safe return to ambient air.

F.R.L.

**A67-41575 #**

AN EVALUATION OF POTENTIAL DECOMPRESSION HAZARDS IN SMALL PRESSURIZED AIRCRAFT.

John J. Swearingen (Federal Aviation Administration, Aeromedical Service, Civil Aeromedical Institute, Oklahoma City, Okla.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 108, 109. Abridged.

Attempt to determine whether wind-blast effects would be sufficient to eject passengers or cause serious injury following a window failure in small pressurized aircraft. Decompression tests conducted in a low-pressure chamber with an unusually large accumulator tank produced data indicating that the cabin volumes are sufficient to cause ejections, fatal injuries from head impact, concussion, and unconsciousness, and in some cases even lung rupture. Consideration should be given to equipping all pressurized aircraft with double-pane windows and plug-type exits.

F.R.L.

**A67-41576 #**

EVIDENCE FOR SEMICIRCULAR CANAL EXCITATION BY ROTATION OF A LINEAR ACCELERATION VECTOR.

A. J. Benson (McGill University, Aviation Medical Research Unit, Montreal, Canada; Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England), F. E. Guedry (McGill University, Aviation Medical Research Unit, Montreal, Canada; U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.), and G. Melville Jones (McGill University, Aviation Medical Research Unit, Montreal, Canada).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 110, 111. Abridged.

Canadian Defence Research Board Grant No. 9910-37.

Investigation to clarify the issue of whether the physiological response of a semicircular canal is derived from otolithic or semicircular canal excitation, or both. Neural responses from canal-driven units in the vestibular nuclei of decerebrate cats were recorded. Results indicate that, for the case of parallel swing rotation, the observed responses were due to some mode of mechanical excitation of the semicircular canal.

F.R.L.

**A67-41577 #**

THE EXCRETION OF URINARY CATECHOLAMINES IN RELATION TO FLIGHT DECK WORK LOADS.

Peter Whittingham (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 112, 113. Abridged.

Experimental investigation of urinary catecholamine excretion in pilots connected with flight-deck work load. It was not possible to demonstrate that urinary catecholamine excretion, which has a close relationship with the physical and mental expenditure of energy

## A67-41578

has an equally close association with work load - i.e., the task which man is obliged to carry out - or his subjective feelings, at any particular time. One reservation may be made about the latter in that one subject produced a total of urinary adrenaline that was higher than any other in the series by day or night. M.M.

## A67-41578 \* =

AN EXPERIMENTAL CARBON DIOXIDE CONCENTRATING SYSTEM.

A. D. Babinsky and R. A. Wynveen (TRW, Inc., Cleveland, Ohio). IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 114, 115. Abridged.  
Contract No. NAS 3-7638.

Description of an electrochemical process for concentrating or separating CO<sub>2</sub> from an oxygen or air atmosphere. The process has been named the Carbonation Cell System when adapted to removing the CO<sub>2</sub> from a space cabin atmosphere. The system offers the following features: (1) CO<sub>2</sub> would be removed from the cabin air on a continuous, noncyclic basis; (2) the output CO<sub>2</sub> is free of diluent-gas contamination; and (3) if required, the system is capable of concentrating CO<sub>2</sub> from air at any partial pressure down to the normal atmospheric concentration of 0.03%. The system is composed of a series of three electrochemical cell stages. Each stage is capable of transferring a different gas composition. The process is feasible and the system is more than competitive with other, alternate methods. M.M.

## A67-41579 #

FAILURES IN NAVY JET REPLACEMENT PILOT TRAINING.

R. F. Reinhardt (U.S. Naval Medical Center, Aerospace Medical Institute, Pensacola, Fla.) and A. J. Adeeb. IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 117, 118. Abridged.

Study of 30 naval aviators who failed to complete jet replacement pilot training. The significant history revealed the following findings: (1) nine of the group (30%) had experienced major difficulty with instrument flying at some point in their career; (2) seven (23%) reported strong disapproval of their flying by their next of kin, usually the wife; (3) seven (23%) had been involved in at least one major aircraft accident and, of this number, two had two accidents each; (4) in six (20%) of the cases, the sick call entries over the preceding two years averaged more than two per month; (5) five (17%) of the cases reported an unusually strong sensitivity to instructor criticism. In each case, psychiatric interviews, psychological testing, and questionnaires designed to elicit significant historical data were used. M.M.

## A67-41580 #

FLASHBLINDNESS STUDIES IN AIRCRAFT SIMULATORS.

Albert V. Alder (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.). IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 119, 120. Abridged.  
DASA-sponsored research.

Brief description of flashblindness studies conducted in four Air Force flight simulators. Seventy-eight subjects participated in flight-simulator experiments. The mean of flashblindness

recovery times, number of exposures in each case, and the standard deviations are tabulated. Periods of flashblindness recovery time lasting up to 29 seconds were measured under realistic cockpit conditions. The reduction of recovery time from 29 to 10 seconds by means of increased instrument-panel illumination of 100 lux was shown. Recovery time was 30% less than would have been predicted from laboratory data. During periods of flashblindness, there was a loss of simulator flight control in 40% of the cases. Although loss of control is evident in the simulator, it cannot be implied that there will be a corresponding loss of flight control in aircraft. No evidence of a sterile reaction in terms of aircraft control was found. M.M.

## A67-41581 #

FLIGHT EVALUATION OF SIMPLE LIQUID TRANSPORT COOLING SYSTEM FOR AIRCREWMEMBERS.

C. M. Hatlelid, J. E. Armstrong, and C. E. Harris (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio). IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 121, 122. Abridged.

Evaluation of a simple liquid-transport cooling system for aircrew members. The goals of the evaluation were to collect sweat-rate data from aircrew members wearing and not wearing the garment and to get subjective opinions on the acceptance of the equipment. Questionnaires showed complete acceptance of the concept of a water-cooled vest from the viewpoint of the subjects. The results obtained indicated that the cooling system measurably decreased sweat rates of USAF aircrew members acclimatized from two to five years in the tropics to combat operations and training. M.M.

## A67-41582 #

FURTHER DEVELOPMENT OF THE FIELD EFFECT MONITOR.

William A. Shafer (General Dynamics Corp., Convair Div., San Diego, Calif.). IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 125, 126. Abridged.

Discussion of experiments carried out with the Field Effect Monitor, a new concept for biomonitoring cardiovascular variables. Subjects have been monitored in many positions and under many conditions. They have been monitored for long periods of time without restriction to motion or placed in special positions. The system has been flown monitoring both pilot and copilot. The work so far has demonstrated that this device shows much promise as a useful tool in determining changes in cardiovascular events that have not been measured before. Aside from uses which are being devised for aerospace experiments, the system would have use in intensive-care units, severely burned patients, cardiovascular research, clandestine monitoring, and further investigations of low-frequency electromagnetic phenomena of human physiology. M.M.

## A67-41583 #

THE GALACTIC RADIATION HAZARD IN LONG-TERM SPACE MISSIONS.

H. J. Schaefer (U.S. Naval Medical Center, Aerospace Medical Institute, Pensacola, Fla.). IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 127, 128. Abridged.

Assessment of the long-term effects on man of accumulated exposure to galactic radiation. A mean RBE (relative biological effectiveness) value of 1.8 is obtained for the galactic radiation exposure. It is pointed out that this estimate is very cautious, inasmuch as it makes the assumption that radiation-induced life shortening is a nonthreshold-type reaction. On the other hand the estimate does not consider at all a possibly substantial enhancement of the effect from the microbeams of heavy nuclei. In any case, a life-shortening effect of 20% (in the sense that, for 100 days of full galactic exposure in free space, the residual lifespan of the astronaut would be shortened by 20 days) would seem to constitute a reasonable basis to work from, if official issues of adequate compensation for hazardous duty or forensic problems are to be settled. M.M.

#### A67-41584 #

##### THE GRAVITOINERTIAL ACCELERATIVE FORCES ACTING ON THE VESTIBULAR ORGANS DURING LOCOMOTION AT LUNAR AND EARTH GRAVITY.

Robert S. Kellogg (USAF, Washington, D.C.), Aston Graybiel, and Earl F. Miller, II (U.S. Navy, Washington, D.C.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 129, 130. 8 refs. Abridged.

Investigation of the linear accelerative forces acting on the vestibular system while walking at lunar and selected sub-g levels. Four subjects, ranging in weight from 160 to 192 lb, were tested in both full-pressure suit and shirt-sleeve conditions. The essential results of the study are summarized in graphs of the average maximum and minimum g values from the head accelerometer plotted against the aircraft acceleration. Tracings taken from the average vertical-acceleration components of the footfalls from the walkway showed the following trend: (1) in both pressure-suited and shirt-sleeve conditions, the average minimum vertical footfall acceleration was approximately .1 g higher than the average head acceleration; (2) in the pressure-suited condition, the average maximum vertical footfall acceleration was .05 g greater than the average maximum head acceleration; and (3) in the nonsuited condition, the variation between the average maximum vertical footfall acceleration and average maximum head acceleration was less than .05 g. M.M.

#### A67-41585 #

##### HABITUATION TRANSFERENCE IN CORIOLIS ACCELERATION. P. J. Dowd (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 131, 132. 5 refs. Abridged.

Investigation of habituation transference from passive lateral chair tilts to active lateral or frontal head tilts, and to active sagittal head tilts during rotation. Twelve subjects were tested on the School of Aerospace Medicine (USAFSAM) biaxial stimulator, which consists of a tilting chair mounted on a rotating platform. It was found that in the automatic reaction index to Coriolis stimulation with repeated exposure to such tilts (active or passive) habituation occurred between trial 1 and 6. P.v.T.

#### A67-41586 \* #

##### HELIUM BREATHING AND EXERCISE HYPERPNEA.

J. P. Henry (VA Center, White River Junction, Vt.; Dartmouth College, Medical School, Dept. of Physiology, Hanover, N.H.) and H. R. Greider (VA Center, White River Junction, Vt.; Dartmouth College, Medical School, Dept. of Physiology, Hanover, N.H.; NASA, Manned Spacecraft Center, Houston, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 134, 135. Abridged.

Research supported by the VA Center.

Experiments undertaken to find relief from cardiovascular and respiratory distress observed by astronauts during extravehicular activity from orbiting capsules. The subjects inspired air and a mixture of 20% oxygen in helium in random order. Nine normal adult males pedaled against a resistance, and their work rate was calculated from torque and rate of revolution. A positive difference upon switching from air to helium breathing was observed. P.v.T.

#### A67-41587 \* #

##### HEMATOLOGICAL CRITERIA OF CHRONIC ACCELERATION STRESS AND ADAPTATION.

R. R. Burton, S. J. Sluka, E. L. Besch, and A. H. Smith (California, University, Dept. of Animal Physiology, Davis, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 136, 137. Abridged.

Grant No. NGR-05-004-008.

Hematological study (leucocyte counts) of chickens which had been exposed to increased chronic acceleration to determine if they might serve as useful parameters to estimate the physiological status (with respect to stress and adaptation) of these birds. On a group basis, it appeared that the stress pattern continued for approximately five months, after which time the blood picture returned to the control values, and it was assumed that a physiological adaptation had become established in these animals. A relative lymphocyte count was found to be a good method (repeatable) to determine the physiological status of the individual bird. P.v.T.

#### A67-41588 #

##### HEMODYNAMIC EFFECTS OF FOUR HOURS OF HYPOXIA IN THE DOG AND BABOON.

John C. Elliott and R. H. Murray (Ohio State University, Dept. of Preventive Medicine, Columbus, Ohio; Indiana University, Cardiorespiratory Laboratory, Wright-Patterson AFB, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 138, 139. Abridged.

Study of the circulatory response of the dog and baboon during moderate hypoxia for 4 hr. It was found that the pulmonary arterial pressure (PAP) of both species of animals responds with an increase in pressure to a sufficiently severe hypoxia stimulus. This response appears to be of two types - an immediate response and a delayed, more sustained response. The increase in the PAP during the first 15 min period was 45%; concurrently the cardiac output increased by 33%, which would account for a large part of the total increase in the PAP. Various other effects on the organs of the test animals are discussed. P.v.T.

#### A67-41589 #

##### HOW MUCH SOPHISTICATION IS REQUIRED TO FABRICATE A SPACE RADIATION MONITORING SYSTEM FOR MANNED SPACECRAFT - A RADIOBIOLOGIST'S VIEWPOINT.

Dean E. Ewing (USAF, Kirtland AFB, N. Mex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 140, 141. Abridged.

Development of a space-radiation monitoring system to form an integral part of the safety of flight systems on manned spacecraft. Among others, the following criteria are proposed: (1) that the system require minimum power, weight, volume, and telemetry; (2)

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that the system be required to provide a radiation exposure history of the astronaut; (3) that no extravehicular activity occur; (4) that no astronaut time be required except in emergency situations; (5) that readout in rads of dose and dose rate be available to the astronaut and to ground control facilities; (6) that the system be at least partially self-sufficient during emergency and/or survey situations; and (7) that the system be easily repaired or replaced in part or in toto. P.v.T.

## A67-41590 #

HUMAN ACCELERATION EXPERIENCE AT THE AEROSPACE MEDICAL RESEARCH DEPARTMENT, U.S. NAVAL AIR DEVELOPMENT CENTER-JOHNSVILLE - 1 JANUARY 1961-30 DECEMBER 1965.

Elihu York, Roman J. Oleynik, and Robert M. Patton (U.S. Naval Material Command, Naval Air Development Center, Aerospace Medical Research Dept., Johnsville, Pa.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 143, 144. Abridged.

Study of the effect of acceleration exposure on 380 subjects accelerated on a centrifuge during the period from 1961 through 1965. The symptoms occurring most often were: grayout, blackout, and motion sickness; chest pain, dyspnea, and arrhythmia. The following miscellaneous complaints were noted: abdominal pain, headaches, syncope, limb myalgia, and parasthesia. P.v.T.

## A67-41591 #

HYPOXIA - A CLINICAL-PHYSIOLOGICAL APPROACH.

S. Finkelstein and U. G. Luft (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 147, 148. Abridged.

PHS Grant No. HE-10298.

Description of an approach to the treatment of hypoxia consisting of the determination of the primary site of the attenuation of oxygen tension in the course of its transfer from the respiratory environment to the cellular level. The purpose is to define the nature and the degree of functional impairment and the procedure framework is given by the five consecutive steps of the "oxygen-cascade" from inspired gas to the tissues. The primary site of the hypoxia is recognized by an unusually low oxygen tension at any step of the sequence preceded by one with normal oxygenation. Several case histories are cited as examples. T.M.

## A67-41592 \*\*

IMPACT DEFORMATION OF VERTEBRAE.

Jeremy F. Crocker (Technology, Inc., Dayton, Ohio) and Lawrence S. Higgins (Technology, Inc., San Antonio, Tex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 149, 150. Abridged.  
Contract No. NASW-1313.

Measurements of the stiffness of the human spinal column under the rates of deflection produced by impact. It is shown that the spinal column in axial compression behaves as a composite structure in which massive, stiff vertebrae alternate with compliant intervertebral disks of low mass. The stiffness of this structure varies with its rate of deflection. T.M.

## A67-41594 \* #

THE INCREASE IN BODY VOLUME RESULTING FROM DECOMPRESSION TO A NEAR VACUUM.

A. J. Pratt (USAF, Systems Command, Aerospace Medical Div., Aeromedical Research Laboratory, Holloman AFB, N. Mex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 153, 154. Abridged.  
NASA-supported research.

Quantitative estimate of the increase in body volume and determination of the pressure changes which cause the expansion of the lungs and thorax during decompression to a near vacuum. The obtained findings were part of a study in which 18 anesthetized mongrel dogs were decompressed in 1 to 2 seconds from an ambient pressure of 179 mm Hg (35,000 ft) to 2 mm Hg (approximately 132,000 ft) where they remained for 60 seconds. Every animal showed an initial expansion of the thorax and abdomen immediately following decompression presumably due to trapped gases. A major second stage of swelling approached a maximum magnitude by 30 seconds and is attributed to subcutaneous emphysema resulting from the vaporization of body fluids. Charts are given showing the tracheal and intrapleural pressure changes in intubated and non-intubated dogs, and the mechanism of gas obstruction by the respiratory channel is considered. The effects of the body-fluid vaporization are outlined. T.M.

## A67-41595 #

INJURY IN LATERAL IMPACT (-Gy) WHEN RESTRAINED BY AIRCRAFT SEAT BELT ONLY.

R. G. Snyder, C. C. Snow, J. W. Young, G. T. Price, and P. Hanson (Federal Aviation Administration, Civil Aeromedical Research Institute, Oklahoma City, Okla.; USAF, Systems Command, Aerospace Medical Div., Aeromedical Research Laboratory, Holloman AFB, N. Mex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 160, 161. Abridged.

Determination of the physical thresholds of irreversible trauma in lateral impact when restrained by an aircraft lap seat belt only. A series of 24 tests was conducted with 24 female baboons at different levels of impact and with forward-facing, rearward-facing, and side-facing positions. Rearward-facing impacts were survivable up to 44 g at 5867 g/sec onset rate for 0.076 sec total duration. Forward-facing impacts typically produced hemorrhages of the meninges and dura at each level of impact from 16.5 to 31 g. Pancreatic hemorrhage occurred in each case. Sideward-facing impacts were found to result in significantly greater injury than either of the other two positions at every impact level from 15 to 44 g. Lap-belt restraint alone does not provide adequate protection for the side-facing occupant. Several categories of injuries resulting in the sideward-facing position are described. T.M.

## A67-41596 #

INTRACRANIAL PRESSURE IN MACACA SPECIOSA DURING CONTROLLED ABRUPT DECELERATION.

R. W. Sonntag, Jr. (USAF, Systems Command, Aerospace Medical Div., Aeromedical Research Laboratory, Holloman AFB, N. Mex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 162, 163. Abridged.

Measurement of the intracranial pressure in a Macaca speciosa monkey subjected to linear deceleration at a wide range of g-loads. The greatest increase in intracranial pressure was 1914 mm Hg at -53 G<sub>z</sub>. Whereas pressure values recorded at impacts up to -30 G<sub>z</sub> appear to be linear, pressure values at comparable +G<sub>z</sub> levels are much smaller in magnitude and have a curvilinear relationship. Three different routes by which visceral inertia can influence intracranial pressure are discussed. T.M.

**A67-41597 #**

LURAIN SIMULATOR FOR EXTENDED METABOLIC STUDIES. B. D. Newsom, R. L. Wolf, and E. J. Russ (General Dynamics Corp., Convair Div., San Diego, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 164, 165. Abridged.

Consideration of the requirements involved in an efficient determination of the oxygen consumption rate during ambulatory exploration of the lunar surface and a brief description of a lunar-terrain simulator designed for facilitating such estimates. Factors determining the rate of oxygen consumption are examined and problems involved in gravity and surface simulation are considered. A circular suspension track providing 1.6-g simulation at a 4-mph rate of travel is described. T.M.

**A67-41598 #**

MAXIMAL STATIC FORCE VERSUS STRESS MEASUREMENTS AS CRITERIA FOR ESTABLISHING OPTIMAL WORK CONDITIONS.

Eberhard K. H. Kroemer (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 166, 167. 6 refs. Abridged.

Analysis of the differences between dynamic and static usage of muscles and the resulting consequences for optimal arrangement of controls. Methods of determining the physical stress of human operators are briefly reviewed, and a series of experiments conducted with different arrangements is described. Conditions judged by the subjects as being most agreeable and producing the least rise in pulse rate were considered to be optimal for the performed dynamic work. Results indicate that measurements of the maximal static forces do not provide an adequate basis for determining conditions which must enable operators to perform dynamic submaximal work with minimum fatigue and physical stress. T.M.

**A67-41599 #**

MEASUREMENT OF GASTROESOPHAGEAL REFLUX IN THE EVALUATION OF HIATUS HERNIA AND CHEST PAIN IN FLIERS.

David B. Skinner and Thomas F. Camp, Jr. (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Surgery Branch, Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 168, 169. Abridged.

Description of a technique for measuring gastroesophageal reflux when evaluating hiatus hernia and chest pain in fliers. Using this standardized technique, reflux can be graded semiquantitatively on a scale from 0 to 3. Results obtained with patients with and without hiatal hernia are discussed in terms of the efficiency of the conducted diagnosis. T.M.

**A67-41600 #**

MEDICAL SUPPORT OF SR-71 PROGRAM.

William B. Dye (USAF, Strategic Air Command, Medical Group, Beale AFB, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 174, 175. Abridged.

Description of the medical-support procedures for crew members of the high-speed, high-altitude SR-71 aircraft. Crew-member selection is briefly described in terms of the psychological and

physiological requirements. Flight-preparation procedures ensure that each member is healthy, well rested, alert, and properly prepared for each flight. Extensive medical examination is given prior to each flight, including a recorded history of any illness, symptoms, medication, and diet over the past 48 hours. The pre-flight meal and weighing procedures are described, together with suiting and denitrogenation before takeoff. Average weight losses in flight are discussed, and postflight examinations are outlined. Crew conditioning for certain flights with late-evening takeoff times and extending into the early morning hours are reviewed. T.M.

**A67-41601 #**

METABOLIC EFFECTS OF MONOMETHYLHYDRAZINE.

Harold L. Bitter, Dale A. Clark, and William W. Lackey (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Biosciences Branch, Physiological Chemistry Section, Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 176, 177. Abridged.

Investigation of the effects of monomethylhydrazine on the metabolism and heat balance, using methods of direct and indirect calorimetry under conditions in which the choice of substrate for the metabolism is limited due to fasting and the administration of nicotinic acid to lower blood lipids. The parameters studied are the respiratory quotient, metabolic rate, size of lipid and carbohydrate pools, urea excretion, and rates and avenues of heat losses. The observed changes are compatible with the hypothesis that monomethylhydrazine decreases protein catabolism, perhaps through the inhibition of transaminase activity. T.M.

**A67-41602 #**

METHEMOGLOBINEMIA AS AN INDICATOR OF EXPOSURE TO MONOMETHYLHYDRAZINE.

Dale A. Clark and Sidney R. Fortney (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Biosciences Branch, Physiological Chemistry Section, Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 178, 179. Abridged.

Review of the known metabolic effects of monomethylhydrazine (MMH) to identify one or more effects that could provide an index to the size of the dose received and the severity of symptoms to be expected. Because it had been observed that MMH produces significant methemoglobinemia in anesthetized dogs, it was thought possible that methemoglobin production might serve as such an index. Observations of tests on human blood support the conclusion that man would also develop methemoglobinemia if exposed to MMH. F.R.L.

**A67-41603 #**

MODERN PSYCHOPHARMACOLOGY IN AERONAUTICAL MEDICINE - ITS VALUE AND DANGERS; ITS PROFESSIONAL CONSEQUENCES.

C. J. Blanc, E. Lafontaine, and R. Laplane (Compagnie Nationale Air France, Paris, France).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 180, 181. Abridged.

Discussion of psychiatric diseases in ground staff and aircrew and their treatment. Neurotic depressions and neuroses arise from conflicting situations linked to professional environment or to private life. Treatment usually includes both psychotherapy and psychotropic drugs. Modern psychopharmacology must be used carefully and exclusively under the control of specialists of aero-

## A67-41604

nautical psychiatry. The use of thymoanaleptics among pilots should be restricted to serious or exceptional cases of depression, since the prescription of such drugs always involves a long period of flight unfitness. F.R.L.

## A67-41604 #

### A NEW APPROACH TO OPTIMUM COOLING IN VENTILATED IMPERMEABLE CLOTHING.

Norman R. S. Hollies (Gillette Research Institute, Inc., Harris Research Laboratories, Washington, D.C.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 184, 185. Abridged.

Contract No. DA-19-129-QM-1941.

Study of ventilative cooling of impermeable clothing, using ambient air over a range of physiological activity including heavy working conditions. The purpose was to determine what space size and design, as well as airflow rate, should be used to give maximum evaporative cooling under conditions of severe environmental stress. Experiments made with a man-simulant, a clothing-simulant, and an environmental-simulant indicate that model space-clothing designs which drastically alter the airflow patterns over the wet skin are quite desirable for achieving efficient cooling. F.R.L.

## A67-41605 \* #

### NORMAL MAN AND CHRONIC HYPERCAPNIA - METABOLIC ASPECTS.

H. Glatte and B. E. Welch (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 186, 187. Abridged.

NASA-supported research.

Consideration of data pertinent to the question of the response of a normal man to a hypercapnic environment - i.e., the question of his CO<sub>2</sub> tolerance. In the comprehensive studies made, all possible variables were monitored. The metabolic aspects are discussed. Tests with volunteers show that 4% CO<sub>2</sub> is a relatively mild challenge to a sedentary man's adaptive mechanisms. He is able to maintain a pH at the lower levels of normal acidity and then adapt by returning to near control levels. Preliminary evidence indicates that no abnormalities of calcium and phosphorus metabolism should be expected. F.R.L.

## A67-41606 #

### OPEN SEA TESTING OF AVIATOR'S COVERALLS.

Frank J. Formeller (U.S. Navy, Naval Missile Center, Point Mugu, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 192, 193. Abridged.

Preliminary physiological comparisons of the protection given by several types of flight suits under the conditions faced by a downed aviator in a raft on the open sea. In the first phase of the study, personnel in open rafts wore the various types of flight suits then available. In the second phase more recently designed, loose-fitting wet suits were worn to determine if they would provide a greater amount of physiological protection under the same conditions. Results indicate that the amount of circulating water in a wet suit has a pronounced effect upon the protection it affords. F.R.L.

## A67-41608 #

### OXYGEN - SOLID VS GASEOUS VS LIQUID.

Arthur E. Miller (Scott Aviation Corp., Lancaster, N.Y.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 197, 198. Abridged.

Comparison of the advantages of solid, liquid, and gaseous oxygen in terms of weight, volume, storage efficiency, and general availability. The weight of 120 ft<sup>3</sup> of oxygen is given for the gaseous, liquid, and solid-chemical states. The ratio of the oxygen delivered to the volume of oxygen stored is discussed, taking into account the volume of the necessary containers and release mechanisms. The weight of the container and control apparatus for each state of oxygen is considered, and some mechanical problems involved in utilizing each of these methods of providing highly concentrated oxygen are outlined. Losses associated with storage are discussed, as well as the relative dangers presented. The overall availability of each form is compared, and it is concluded that solid-state oxygen offers significant advantages over both liquid and gaseous oxygen. T.M.

## A67-41609 #

### PARA-SAIL IN USAF UNDERGRADUATE PILOT TRAINING.

David D. Vause (USAF, Air Training Command, Stead AFB, Nev.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 199, 200. Abridged.

Evaluation of the 24-ft-diam Para-Sail ascending parachute for parachute descent training. The Para-Sail is a gliding parachute with air venting through slots so arranged as to shape the canopy to a lifting form when towed. For ascent the student is gently towed into the wind at a rate up to 16 mph, causing the Para-Sail to rise kite-fashion to 400 ft or higher. Descent rates can be varied from 0 to about 13 fps. Training-program results indicate that the parachute increased the student's confidence and experience with parachute systems. T.M.

## A67-41610 \* #

### PATHOPHYSIOLOGICAL RESPONSES TO -G<sub>z</sub> IMPACT AS INFLUENCED BY ENERGY TRANSFER.

S. H. Advani and C. F. Lombard (Northrop Corp., Northrop Nortronics, Northrop Systems Laboratories, Palos Verdes Peninsula, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 201, 202. Abridged.

Contract No. NAS 9-4539.

Experimental results for the survival-limit dependence on the energy-transfer rate of guinea pigs during -G<sub>z</sub> oriented impact. Tests at velocity changes of 20, 40, and 60 ft/sec indicate that the bradycardia threshold is governed by a definite level of energy transfer and energy-transfer rate. Aortic dynamic considerations are given for Macaca speciosa monkeys for the purpose of studying a mathematical model representation of the aortic subsystem. T.M.

## A67-41611 \* #

### PERSONAL HYGIENE AND SANITATION FOR MANNED SPACE SYSTEMS.

Alton E. Prince (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio), Phyllis E. Riely, and Diane J. Shoreinstein (Fairchild Hiller Corp., Republic Aviation Div., Farmingdale, N.Y.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 203, 204. Abridged.

NASA Contract No. R-85; Contract No. AF 33(615)-3255.

Development of sanitation procedures and criteria for personal hygiene for long-term space missions. Experiments in a controlled activity facility or in a life support systems evaluator showed that the axilla and groin are the first areas to have potentially harmful increase in microbial populations. It is believed that simple whole-body cleansing at least once every two weeks with paper wipes moistened with plain water will adequately control body surface microbes.

F.R.L.

#### A67-41612 #

##### PERSONNEL THERMO-PROTECTIVE SYSTEMS.

K. N. Tinklepaugh (U.S. Navy, Naval Missile Center, Advanced Projects Div., Point Mugu, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 205, 206. Abridged.

Description of methods of alleviating the effects that high temperatures may have on crew members within aircraft. A design is presented for a heat exchanger (to control suit temperature) which operates by utilizing the change in phase of a cryogenic liquid to a cold gas to provide cooling. Such cooling would not interfere with the heating to be provided under such emergency conditions as immersion in freezing sea water. The use of Thermal Cream - an inorganic salt - as a heating agent under such conditions is treated.

F.R.L.

#### A67-41613 #

##### PHARMACOLOGICAL ALTERATIONS OF VIBRATION TOLERANCE.

Verne L. Roberts (Michigan, University, Highway Safety Research Institute, Ann Arbor, Mich.) and Roy Aston (Wayne State University, Dept. of Anesthesiology, Detroit, Mich.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 207, 208. 6 refs. Abridged.

Continuation of a previous study which indicated that pharmacological alteration of mortality due to low-frequency vibration is possible in the mouse. Additional pharmacological agents are evaluated for possible protective effects. Extensive studies were made of two automatic drugs, three centrally acting drugs, and one local anesthetic. It suggested that a pharmacologically sensitive component of vibration lethality exists, apart from physical trauma, which is related to central nervous system stimulation.

F.R.L.

#### A67-41614 #

##### PHYSIOLOGICAL ASSESSMENT OF VENTILATED WET SUITS UNDER DIFFERENT ENVIRONMENTAL CONDITIONS.

L. J. SantaMaria, D. J. Horrigan, Jr., and M. H. Radloff (U.S. Naval Air Engineering Center, Aerospace Crew Equipment Laboratory, Philadelphia, Pa.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 209, 210. Abridged.

Assessment of the thermal properties of ventilated wet suits (VWS), modified by the Aerospace Crew Equipment Laboratory (ACEL). The suits were worn by subjects exposed to environmental conditions which varied in ambient temperature, ventilating temperature, and flow rate. The incorporation of a ventilating harness in a wet suit has effected tolerable physiological responses in regard to heat stress indices as set forth in the investigation.

F.R.L.

#### A67-41615 #

##### PHYSIOLOGICAL RESPONSES TO COLD IN MEN DURING AN EXTENDED PERIOD OF SLEEP LOSS.

Vincent Fiorica, E. A. Higgins, P. F. Iampietro, M. T. Lategola, and A. W. Davis, Jr. (Federal Aviation Administration, Aeromedical Service, Civil Aeromedical Research Institute, Oklahoma City, Okla.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 211, 212. Abridged.

Examination of special physiological responses of the sleep-deprived man to the stresses generated by acute whole-body cold exposure. Attempts were made during this study to distinguish the sleep-deprived individual on the basis of psychomotor performance and the urinary excretion of stress and sleep-related substances. From the data obtained from testing twelve subjects, it is concluded that sleep loss in itself is not a physiological stress and that physiological mechanisms associated with the response to cold are not affected by a lack of sleep.

P.v.T.

#### A67-41616 #

##### PHYSIOLOGICAL SUPPORT OF THE SR-71 PROGRAM.

Jack H. Bates (USAF, Strategic Air Command, Medical Group, Beale AFB, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 213, 214. Abridged.

Discussion of the physiological support of the two crewmembers who operate the SR-71 Mach-3+ high-altitude aircraft while wearing pressure suits in a pressure cabin. Attention is given to the Physical Support Division facility, its use by crewmembers, the preparation of equipment for flights, and the training of crewmembers. The life support equipment and its component items are described.

F.R.L.

#### A67-41617 \* #

##### PHYSIOLOGY OF MAN DURING STEADY STATE EXERCISE IN A 180 MM TOTAL PRESSURE ENVIRONMENT.

L. J. Krasnogor, R. R. Wempen, and B. E. Welch (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 215, 216. Abridged.

NASA-supported research.

Description of an experiment aimed at evaluating the physiological suitability of a space-suit atmosphere for prolonged work at moderate workloads. The studies included respiratory, cardiovascular, hematological, metabolic, and psychomotor variables. No clinically significant changes in alveolar and arterial-blood gas parameters were found to accompany mild exercises in the 180-mm-Hg environment.

V.P.

#### A67-41618 #

##### PILOT PERFORMANCE DURING DAY AND NIGHT CARRIER LANDING OPERATIONS.

C. A. Brictson (Dunlap and Associates, Inc., Western Div., Santa Monica, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 217, 218. Abridged.

Contract No. Nonr-4984(00).

Exploratory investigation of day and night pilot landing performance with reference to the significantly higher rate of night landing

## A67-41619

accidents. Measurements of altitude and lateral error were recorded as a function of range from touchdown for 21 experienced Navy pilots who were carrier-qualified in the F-4 Phantom aircraft. The main difference between day and night landings was the pilot's apparent inability to estimate his altitude position accurately.

F. R. L.

## A67-41619 #

PLETHYSMOGRAPHIC DETERMINATION OF LEG VOLUME CHANGES DURING LOWER BODY NEGATIVE PRESSURE. F. Story Musgrave, Fred W. Zechman, and Richard C. Mains (Kentucky, University, Medical Center, Dept. of Physiology and Biophysics, Lexington, Ky.). IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 219, 220. Abridged. Contract No. AF 33(615)-3311.

Description of experiments aimed at determining the (absolute mean) volume changes of each leg in response to commonly used levels and durations of lower-body negative pressure (LBNP). The changes obtained are compared with those produced by other agents or environments capable of affecting the total blood volume or its relative distribution between the thoracic and peripheral venous reservoirs. It is shown that LBNP at 20 and 40-mm-Hg levels produces leg-volume changes and capillary-filtration-rate changes similar to those observed in response to corresponding levels of positive pressure breathing, venous cuffs, and locally applied sub-atmospheric pressure. The mean percent volume increases for all subjects at one, three, and five minutes of LBNP at 40-mm-Hg were 2.95, 3.36, and 3.61%, respectively.

V. P.

## A67-41620 #

POTABLE WATER STANDARDS FOR AEROSPACE SYSTEMS - 1967. A. R. Slonim, A. J. Roth, Jr., A. B. Hearld, S. A. London, and A. West (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio). IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 221, 222. Abridged.

Brief discussion of the specific chemical, microbiological, and radiological requirements to be met by aerospace potable water systems. These standards are meant to serve only as a working guide; it is pointed out that they should be reevaluated and revised periodically according to advances made in life-support technology. B. B.

## A67-41621 #

POTENTIAL TECHNICAL VARIATIONS OF SOLID STATE GENERATORS.

Robert M. Bovard (U.S. Divers Co., Life Support Systems Div.). IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 223, 224. Abridged.

Description of solid-state generators of oxygen which can be manufactured by casting or pressing and are normally formed in a cylindrical shape. The solid-state generator can be activated by several methods (phosphorus disk, percussion cap, electric squib, and hot electric wire). The actual activation can be done manually or electrically from a remote location. The solid-state generators find application in the deepest depths of the ocean to the farthest expanses of space. The generators are a natural source of oxygen for emergency, as well as regular supplies, due to good shelf life.

P. v. T.

## A67-41622 #

PRESENT APPLICATIONS - FUTURE IMPLICATIONS OF AEROSPACE NURSING.

Carol J. Corrado (USAF, Systems Command, National Range Div., Eastern Test Range, Patrick AFB, Fla.). IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 226, 227. Abridged.

Description of an extensive cardiovascular examination performed on each space crew candidate to determine any evidence of cardiovascular disease and to provide baseline information for future comparison. Some of these tests include: vectorcardiography, tilt table studies, and treadmill studies. The vectorcardiogram provides a photograph and a recording of the electric impulse of the heart on three planes. The tilt table test provides information concerning the subject's physiological circulatory adaptive response to position changes. Treadmill studies are used to determine maximum oxygen consumption during maximum physical exertion. The future of women in space is considered, and the need to collect baseline data on the female is noted.

P. v. T.

## A67-41623 #

A PROTECTIVE PASSENGER SMOKE HOOD.

Ernest B. McFadden (Federal Aviation Administration, Aeromedical Service, Civil Aeromedical Research Institute, Oklahoma City, Okla.) and H. I. Reynolds (G. T. Schjeldahl Co., Northfield, Minn.). IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 229, 230. Abridged.

Description of a polyimide smoke hood designed to provide short-duration protection from the effects of inhalation of smoke, toxic gases, and flame. Additional protection is afforded the eyes from the temporary blinding effect of irritant smoke. The hood provides a barrier to direct flame contact with the exposed face and head. A system for metalizing polyimide film with a thin transparent layer of metal, capable of up to 90% IR reflectance was developed. The duration of the usefulness of the hood may be extended by a self-contained supply of uncontaminated breathing air in order to purge and provide supplementary ventilation of the hood.

P. v. T.

## A67-41624 #

PSYCHOLOGIC CONVERSION REACTION - THE AVIATOR'S EMOTIONAL FACE CURTAIN.

J. A. Pursch and R. F. Reinhardt (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.). IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 231, 232. Abridged.

Description of the case histories of a group of patients who were referred with such diagnoses as possible fear of flying, conversion reaction, or psychophysiological symptoms. A review of the records of 181 student naval aviators seen in psychiatric consultation over the period from October 1965 through October 1966 indicated that 31 fell in this category. Four cases are discussed in detail. When a student pilot becomes aware of disenchantment with flying, or perhaps even fear of flying, he has a choice of voluntarily resigning from the flight training program, or of becoming "unfit" for flying by developing "pseudoorganic disease" (psychophysiological or conversion symptoms). The failing or "unfit" student who chooses the face-saving second path usually does so because, in view of his previous life experiences, he cannot allow himself to do otherwise.

P. v. T.

**A67-41625 #**

RADIOGRAPHIC STUDIES OF THE CHEST DURING CHANGES IN POSTURE AND LOWER BODY NEGATIVE PRESSURE.

Robert D. Milledge, Fred W. Zechman, and F. Story Musgrave (Kentucky, University, Medical Center, Dept. of Radiology and Dept. of Physiology and Biophysics, Lexington, Ky.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 233, 234. Abridged.

Study undertaken to determine what, if any, radiological changes in the thorax are associated with physiological changes and to compare them with those observed in shifting from the supine to the erect posture. All five subjects tested and examined showed a depression of the diaphragm, as measured by the method of Lennon, and a decrease in the transverse diameter of the heart. The typical subject showed a 1-cm decrease in the transverse diameter of the heart and a 1.5 to 2.0 cm depression of the diaphragm both centrally and peripherally. The radiographic changes varied little in magnitude among the subjects.

P.v.T.

**A67-41626 #**

RADIOISOTOPIC COLOR SCANNING OF PULMONARY AEROEMBOLI IN EXPERIMENTAL DECOMPRESSION SICKNESS - DYSBARISM.

A. T. K. Cockett, N. L. Mangelson, R. T. Kado, and L. Swanson (Harbor General Hospital, Dept. of Surgery/Urology, California, University, School of Medicine, Space Biology Laboratories, Los Angeles, Calif.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 235, 236. Abridged.

Description of a new diagnostic test - pulmonary lung scanning, which was modified to include color coding. New lateral scans were included during pulmonary mapping in order to scan the lateral fields of the left or right lung. Time-sequence color scans were also performed to determine the periods following decomposition when involvement in the pulmonary arterial tree appeared to be most severe.

P.v.T.

**A67-41627 #**

RAPID DETECTION OF MICROORGANISMS IN AEROSPACE WATER SYSTEMS.

G. V. Levin, E. Usdin (Hazleton Laboratories, Inc., Life Systems Div., Falls Church, Va.), and A. R. Slonim (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 237-239. Abridged.

Contract No. AF 33(615)-3996.

Development of a method for detecting microbial contamination of manned spacecraft water supplies by utilizing the bioluminescent reaction of the firefly. The current status of the method permits the detection of several hundred cells, or less, within a minute. The following steps comprise the assay technique: (1) preparation of firefly-lantern reaction mixture; (2) placement of aliquot of reaction mixture into cuvette in light-sensing instrument; (3) extraction of microbial adenosinetriphosphate from suspect water sample; (4) injection of aliquot of sample extract into cuvette containing firefly-lantern reaction mixture; and (5) measurement of peak light intensity produced by reaction.

P.v.T.

**A67-41628 #**

RAPID FREE-FILM PARTICLE ELECTROPHORESIS - A NEW CLINICAL CAPABILITY.

A. Strickler, V. R. Huebner, and S. Shacks (Beckman Instruments, Inc., Fullerton, Calif.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 240, 241. Abridged.

Description of a recently developed rapid and precise technique for electrophoresis of particles. This method opens new possibilities in the clinical field for rapid identification of microorganisms, study of the formed elements of blood, and the detection and quantitation of antigen-antibody reactions. The instrument promises to be useful also for serum protein analysis, where it would provide a new, ultrarapid capability.

P.v.T.

**A67-41629 #**

THE RATIONALE OF MASK-MOUNTED HYPOXIA WARNING SYSTEMS.

K. N. Ackles (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England; Defence Research Board, Defence Research Medical Laboratories, Toronto, Canada), J. Ernsting, and A. J. F. Macmillan (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 242, 243. Abridged.

Observation that the ideal hypoxia warning device should detect, at the earliest possible moment, any situation which will give rise to hypoxia but should not give spurious warnings. Laboratory tests have shown that a mask-mounted PO<sub>2</sub> sensor with a response time of the order of 5 to 6 sec cannot be used to provide adequate warning of hypoxia, if, at the same time, spurious warnings are to be avoided. The ability of a system to detect hypoxia without a high incidence of spurious warnings may be improved by placing the sensor either in the mask inlet or beyond the expiratory valve.

M.F.

**A67-41630 \* #**

REACH EFFECTIVENESS IN A ROTATING ENVIRONMENT.

T. W. O'Laughlin, J. F. Brady, and B. D. Newsom (General Dynamics Corp., Convair Div., San Diego, Calif.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 244, 245. 6 refs. Abridged.

Contract No. NAS 9-5232.

Results of a study designed to investigate the possible effects, in a rotating environment, of Coriolis forces on gross reach movements requiring timely and precise contact with instrument-control consoles. The experiments show that Coriolis forces have no measurable effect on the precision and accuracy of reach activities in a rotating environment.

M.F.

**A67-41631 #**

RECOVERY OF POTABLE WATER FROM HUMAN URINE IN A SPACE CABIN SIMULATOR WITH AN OPEN CYCLE AIR EVAPORATION SYSTEM.

D. F. Putnam and E. C. Thomas (McDonnell Douglas Corp., Douglas Aircraft Co., Advance Biotechnology and Power Dept., Santa Monica, Calif.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 246, 247. Abridged.

## A67-41632

Discussion of an open-cycle air-evaporation urine-processing system. The specific advantages of this system are summarized, and a new method of feeding urine is described which prevents flooding of the wick evaporator. The essence of this method is to size the wick evaporator and set the air inlet conditions so that the potential evaporation rate is substantially greater than the selected feeding rate, making flooding of the wick virtually impossible and enabling the use of a simple timing mechanism to control the rate of urine feed. M.F.

### A67-41632 \* #

THE RELATION OF OXYGEN TOXICITY TO NUTRITIONAL AND HORMONAL FACTORS.  
G. A. Brooksby, H. A. Leon, and M. J. Chackerian (NASA, Ames Research Center, Moffett Field, Calif.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 250, 251. Abridged.

Attempt to determine whether a decreased food intake either singly or in combination with altered hormonal levels is a factor in the development of symptoms associated with oxygen toxicity. It is found that growth hormone by itself is without action in altering the susceptibility to high  $O_2$  pressures. It was also found that the susceptibility to  $O_2$  toxicity has some relation to the physiological age of the animal and is not necessarily time-dependent. M.F.

### A67-41633 #

RELATIONS BETWEEN NEURAL AND MECHANICAL RESPONSES OF THE SEMICIRCULAR CANAL.  
G. Melvill Jones and J. H. Milsum (McGill University, Aviation Medical Research Unit and Biomedical Engineering Unit, Montreal, Canada).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 252, 253. Abridged.  
Canadian Defence Research Board Grant No. 9910-37.

Results of experiments designed to examine the fidelity with which neural units in the vestibular nuclei follow predicted patterns of mechanical end-organ response. Experiments were made on decerebrate cats. From results obtained, it seems that at least some components of neural response at the second-order neurone level in the central nervous system carry the information predicted from a knowledge of end-organ mechanics, which substantiates the general view that prediction of sensory error development during known flight profiles may be formulated on a reasonably rational basis. M.F.

### A67-41634 #

RENIN SECRETION DURING  $+G_z$  ACCELERATION.  
J. D. Rogge, A. F. Fasola, and B. L. Martz (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.; Marion County General Hospital, Lilly Laboratory for Clinical Research, Indianapolis, Ind.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 259, 260. Abridged.

Study of the relation of the renin-angiotensin system to the adaptation of humans to the circulatory stress induced by  $+G_z$  acceleration, by measuring renin secretion from changes in the peripheral venous renin levels. Higher plasma renin levels during acceleration, increasing further during longer runs at the same  $g$  levels, are established. V.Z.

### A67-41635 #

RESPONSE OF SQUIRREL MONKEYS TO HYPEROXYGENATION PRIOR TO AND DURING HIGH  $G$ , LONG DURATION ACCELERATION.  
Bruce W. Pince and Jeffry S. Life (Space/Defense Corp., Birmingham, Mich.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 261, 262. 12 refs. Abridged.

Description of experiments aimed at determining the role of oxygen on the cardiac rate in monkeys exposed to an accelerative stress on the order of  $200 +G_x$  for 200 sec on a centrifuge. The results indicate that the primate heart exposed to such acceleration demonstrates an initial high parasympathetic tone; this predominate influence augments an apparent intrinsic bradycardic response of the heart to acceleration. This response is attributed to metabolic changes or mechanical distortion in the conduction system or the myocardium itself. V.P.

### A67-41636 #

RESPONSE OF THE PHARMACOLOGICALLY DENERVATED HEART TO ACCELERATIVE STRESS.  
Jeffry S. Life and Bruce W. Pince (Space/Defense Corp., Birmingham, Mich.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 263, 264. Abridged.

Description of centrifuge tests with squirrel monkeys, showing that the primate heart exposed to high accelerative stress demonstrates an initial high parasympathetic tone which is blocked by atropine sulfate or hexamethonium chloride. This predominate influence augments an intrinsic bradycardic response of the heart to acceleration. Cardiac inhibition is opposed by sympathetic influences. These influences have modest effects, however, because of the overwhelming inhibitory influence of the parasympathetic nervous system. V.P.

### A67-41637 #

THE RESTORATION OF CARDIOVASCULAR INTEGRITY IN POST MYOCARDIALLY-INFARCTED AVIATION PERSONNEL.  
M. T. Lategola and J. Naughton (Federal Aviation Administration, Washington, D.C.; Oklahoma, University, Medical Center, Dept. of Medicine, Oklahoma City, Okla.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 265, 266. Abridged.

Note on prolonged observations of the rehabilitation to work duties of a group of aviation personnel with a history of myocardial infarction, left bundle branch block, and hypertension. The three-year medical histories of two recovered airmen with myocardial infarction episodes are described in detail. V.Z.

### A67-41638 #

RETINAL CIRCULATION IN MAN DURING  $+G_z$  ACCELERATION.  
S. D. Leverett, Jr., V. E. Kirkland, T. J. Schermerhorn, and W. A. Newsom (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Biodynamics Branch and Ophthalmology Branch, Brooks AFB, Tex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 267, 268. Abridged.

Photographic study of blackout during radial acceleration on a centrifuge. A series of color photographs shows moment-to-moment changes in the retinal circulation. Evidence is presented to confirm central retinal arterial pulsation followed by collapse in the optic-disk region. During this arterial collapse, however, the retinal veins appear of normal size with blood gradually darkening. It is assumed that venous collapse may occur even before arterial collapse, provided that the collapse is due to a pure hydrostatic column difference. It may well be that anatomical deformation of the vein at its exit from the globe restricts outward flow, and, since the artery is already collapsed, and presumably also the capillary bed, blood can only be trapped in the vein. This would also explain the gradually darkened appearance of venous blood while the arteries remain collapsed at the blackout level of the subject. The protection of gradually applied acceleration is demonstrated by showing that retinal circulation remains intact at a level higher under these conditions than when the acceleration is applied at a rapid rate.

V. P.

**A67-41639 #**

RETINAL FLUORESCENCE ANGIOGRAPHY DURING BLACKOUT ON THE HUMAN CENTRIFUGE.

W. A. Newsom, V. E. Kirkland, S. D. Leverett, Jr., and T. J. Schermerhorn (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Biodynamics Branch and Ophthalmology Branch, Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 269, 270. Abridged.

Application of the fluorescence angiography technique to a study of the effects of centrifugal acceleration on the retinal circulation. Photographic evidence of the stopping of retinal circulation during blackout is obtained. It is shown that the arteries collapse with retrograde flow during blackout.

V. P.

**A67-41640 #**

SAFETY MONITORING INSTRUMENTATION FOR THE LUNAR MODULE INTERNAL ENVIRONMENT SIMULATOR.

C. R. Belensky, H. Wajsgas (Grumman Aircraft Engineering Corp., Bethpage, N.Y.), and J. Rampack (Spacelabs, Inc., Van Nuys, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 271, 272. Abridged.

Note on a biomedical monitoring system utilizing Apollo-type body-worn signal conditioners for manned operation in a low-pressure oxygen-filled internal-environment simulator (IES). The simulator was built in order to evaluate the Lunar Module environment-control system (ECS) clear of manned operations. The monitoring system accommodates electrocardiogram, phonocardiogram, impedance pneumogram, skin temperature, suit pressure, oxygen partial pressure, and carbon dioxide partial pressure.

V. Z.

**A67-41641 #**

A SEVEN YEAR FOLLOW-UP X-RAY SURVEY FOR BONE CHANGES IN LOW PRESSURE CHAMBER OPERATORS.

C. J. Hodgson, J. C. Davis, C. L. Randolph, Jr., and G. H. Chambers (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB; USAF, Systems Command, Aerospace Medical Div., Wilford Hall Hospital, Lackland AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 273, 274. 5 refs. Abridged.

Note on a long-bone X-ray survey for a large group of Air Force low-pressure chamber operators, repeated in 1965 after a previous X-ray survey in 1958. The second survey was made to determine possible long-term effects of decompression sickness. Only two subjects of the survey were found to have lesions consistent with those found in caisson workers and divers.

V. Z.

**A67-41642 #**

SIGNIFICANT DIFFERENCES (BOTH QUALITATIVE AND QUANTITATIVE) IN MICROBIAL LEVELS IN CLOSED ENVIRONMENTS. Phyllis E. Riely (Pall Corp., Glen Cove, N.Y.), Alton E. Prince (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio), James D. Gatts (Fairchild Hiller Corp., Republic Aviation Div., Farmingdale, N.Y.), and Diane Shoreinstein (International Business Machines Corp., Bethesda, Md.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 275, 276. Abridged.

Investigation of the composition of the indigenous biologic flora of 11 human male subjects under controlled experimental conditions. The effect of diet on the fecal flora was also studied. The quantitative results of the environmental sampling are shown in a composite graph. While minor fluctuations are present, there appears to be a general rise in the level of bacteria proportional to the time of occupancy. The types of organisms isolated from the varied plates used in the sampling procedure are tabulated. Swabs taken from selected room areas were cultured to indicate any possible interchange between man and the environment. One of the most important conclusions resulting from the investigation is the determination of marked shifts in nonsporulating fecal anaerobes.

M. M.

**A67-41643 \* #**

SIZE MATCHING ACCURACY UNDER VERY HIGH TARGET LUMINANCES.

Richard F. Haines (NASA, Ames Research Center, Moffett Field, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 278, 279. 14 refs. Abridged.

Psychophysical study of the effects of irradiation phenomena on the perception of target size, by investigating the following variables: (1) target luminance, (2) fixation position, and (3) allowing or not allowing corrections. It was found that the irradiation phenomenon reduces the congruence between what is seen and what is actually present. Since much of the visual space environment can be expected to augment the irradiation phenomenon, it is important to understand the basic visual processes and perceptual end results associated with the high-luminance space environment. The investigations quantified the effects of the simulated visual environment on the judgment of relative target size.

M. M.

**A67-41644 #**

SKIN RESPONSE OF THE RAT TO 13 MEV PROTON IRRADIATION.

J. E. Prince, B. L. Caraway, D. K. Hinkle (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.), M. D. Harris, Jr. (USAF, Systems Command, Research and Technology Div., Weapons Laboratory, Kirtland AFB, N. Mex.), and Ira L. Morgan (Texas Nuclear Corp., Austin, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 280, 281. Abridged.

Results of a 3-1/2-yr investigation of the cellular-level effects, acute and chronic, of 13-Mev proton irradiation in rat skin. At

## A67-41645

the 2500-rad level, behavioral abnormalities consisting of anxiety and nervousness were evident immediately following irradiation. Hyperirritability and extreme skin sensitivity were noted within 12 days of postirradiation. The latter responses also extended to the 2000-rad level. By 14 days of postirradiation, epilation and focal ulceration of the epithelium were evident at both rad levels. By the 41st day of postirradiation, irreversible hair loss was noted in all animals. At the 1300 rad level, similar, but less extensive, lesions were noted. Animals receiving 700 rad were essentially devoid of gross clinical changes, other than weight loss, up to 140 days of postirradiation. M. M.

## A67-41645 #

### SKIN RESPONSE OF THE RAT TO 13 MEV PROTON IRRADIATION. II.

H. W. Casey, D. K. Hinkle, J. E. Prince, B. L. Caraway, and W. T. Williams (USAF, Washington, D.C.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 282, 283. Abridged.

Description of the pathological effects, including carcinogenesis, of 13-Mev proton whole-body irradiation in rats. The results obtained indicate that low-energy protons are highly carcinogenic and that, in rats, significant neoplastic changes occur with low radiation doses. As similar histological types of neoplasms have been observed in man following accidental skin exposures to other types of ionizing radiation, these results suggest that carcinogenesis may be one of the more important irradiation hazards in some manned space missions. M. M.

## A67-41646 #

### SOME RESULTS OF USING HELIUM AS THE SPACE CABIN ATMOSPHERE DILUENT.

J. G. Gaume and C. R. Adams (McDonnell Douglas Corp., Douglas Aircraft Co., Missile and Space Systems Div., Huntington Beach, Calif.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 284, 285. Abridged.

Description of the results of two space-cabin simulator (SCS) tests in helium-oxygen mixtures conducted at various total pressures and ratios of oxygen to diluent gas. The tests appear to substantiate the view that, from the physiological standpoint, it makes little difference whether nitrogen or helium is the diluent. The tests show that the selection of the diluent will be made on the basis of engineering considerations for the cabin pressures involved. M. M.

## A67-41647 #

### STUDIES ON AN ADVANCED PASSIVELY PRESSURIZING PARTIAL PRESSURE SUIT.

Jefferson C. Davis, Frederick R. Ritzinger, Jr., and Larry E. Noble (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Aeromedical Indoctrination Branch, Brooks AFB, Tex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 286, 287. Abridged.

Results of altitude-chamber studies of a refined passively pressurizing partial pressure suit. It was found that this suit offers a number of advantages for certain applications. As a get-me-down pressure suit for crew members of the proposed SST, it provides the shirt-sleeve comfort required to gain acceptance of crew members who will operate in the ideal and relatively foolproof environment. The 1-hr duration demonstrated at 70,000 ft will be extended in future tests to show the feasibility of the suit as a mission-completion garment for high-altitude military aircraft. M. M.

## A67-41648 #

### SULFHYDRYL PROTECTION IN RATS EXPOSED TO FRACTIONATED ACUTE DOSES OF X- AND GAMMA RADIATION.

George S. Melville, Jr. and Arthur E. Gass, Jr. (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Radiobiology Branch, Brooks AFB, Tex.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 289, 290. Abridged.  
DASA-supported research.

Discussion of fractional studies showing that AET and L cystine are radioprotective against single lethal doses of electromagnetic radiation and have dose-reduction factors of 1.4 and 1.6, respectively. Protection against successive radiation exposures can be achieved by successive administration of sulphydrylamine drugs. In rats, this protection is displayed at high and low dose rates and at sublethal, lethal, and supralethal levels with either X rays or  $\gamma$  rays. V. P.

## A67-41649 #

### SURVIVAL OF RATS EXPOSED TO 10 PSIA OXYGEN TO FURTHER EXPOSURE AT ONE ATMOSPHERE OXYGEN.

George H. Kydd (U.S. Naval Material Command, Naval Air Development Center, Aerospace Medical Research Dept., Johnsville, Pa.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 291, 292. Abridged.

Discussion of experiments in which the relationship between the reported changes in the microstructure of the lung produced by long-term breathing of 100% oxygen at one atmosphere and the acutely fatal outcome of such exposures was investigated on rats (after pre-exposure at 2/3 atmospheres). It is found that exposure to the lower pressure (516 mm Hg) confers significant resistance to subsequent exposure at the higher pressure (760 mm Hg) and that this resistance does not entirely prevent the development of respiratory abnormalities but in most animals attenuates them and prevents a crisis or death. V. P.

## A67-41650 #

### A SURVIVAL STUDY OF A MODERN COMMERCIAL JET AIRCRAFT (BOEING 727) LANDING ACCIDENT WITH SUBSEQUENT INTERIOR FIRE. II.

Clyde C. Snow, Ernest B. McFadden (Federal Aviation Administration, Aeromedical Service, Civil Aeromedical Research Institute, Oklahoma City, Okla.), and C. Hayden LeRoy (Civil Aeronautics Board, Bureau of Safety, Washington, D.C.).  
IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]  
Washington, D.C., American Medical Association, 1967, p. 293, 294. Abridged.

Analysis of the landing accident of an 85-passenger jet aircraft, with 41 dead aboard. The following features bearing on mortality and injuries are emphasized: (1) decelerative forces were mild; (2) fire broke out in the passenger cabin within seconds of impact; (3) 30 to 50 seconds passed before the aircraft stopped moving and evacuation could begin; and (4) during this latter period, a rapid buildup of fire and smoke occurred and the main lighting system failed. The predominance of smoke as a mortality factor was also suggested by the fact that 17 out of 27 persons seated forward of the galley died aboard the aircraft, compared to only 20 deaths among 50 passengers seated aft of the galley. Recommendations are made for decreasing mortality in this type of accident. M. M.

## A67-41651 #

### A TELEMETRY SYSTEM FOR PHYSIOLOGICAL EVALUATION OF SPACE SUITS.

D. A. Ratino, A. Marko, and W. C. Kaufman (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 295. Abridged.

Note on an improved telemetry system for measuring body temperature and heart rate with minimum impedance. The seven-channel pulse-duration multiplexed system transmits an electrocardiogram, rectal temperature with an accuracy higher than  $\pm 0.05^\circ\text{C}$ , and the temperature of five skin regions with an accuracy higher than  $\pm 0.2^\circ\text{C}$ .

V. Z.

#### A67-41652 #

##### TOLERANCE TO LONG DURATION $+G_x$ ACCELERATION.

W. K. Brown and J. D. Rogge (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Biodynamics Branch, Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 298, 299. Abridged.

Discussion of tests in which seven healthy adult male subjects were subjected to a total of nine periods of roughly three hours on the SAM human centrifuge. The resultant acceleration vector was  $+2 G_x$  with the subject supine with elevated knees. The response to a  $60^\circ$  head-up tilt was measured before and after the centrifuge ride. Urine and venous serum samples taken before and after acceleration were analyzed for sodium, potassium, and osmolality. Estimates of splanchnic blood flow (before and during centrifugation) were obtained by comparison of the rate of extraction of indocyanin green during acceleration with that of the control ( $\pm 1 G_x$ ). After one hour of centrifugation, splanchnic blood flow increased 46.7% over the control level (range 6.3 to 108%). Estimates of splanchnic resistance decreased 25% (range 4.5 to 54%) at the end of one hour on the centrifuge.

V. P.

#### A67-41653 #

##### TRANSIENT CHANGES IN ARTERIAL OXYGEN TENSION DURING ACCELERATION.

D. H. Glaister (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 301, 302. 6 refs. Abridged.

Discussion of tests in which greyhounds were anesthetized with pentobarbitone sodium (30 mg/kg) and strapped sitting erect in a frame mounted in the centrifuge gondola. An abdominal binder was used to limit the increase in lung volume resulting from exposure to positive acceleration. The level of anesthesia was maintained by repeated injections of barbiturate. The oxygen tension of arterial blood was recorded using a microelectrode and a physiological gas analyzer, the system being insensitive to accelerations of up to 5 g. It was found that cardiac output may fall to as little as 20% of the control value at 3 to 4 g. Sampling of pulmonary arterial blood for its carbon dioxide tension showed that this increases slightly during acceleration, even when the ventilation is kept constant, but that there is a marked reduction in the concentration of this gas in the expired air. These changes are explicable on the basis of an increased alveolar dead space due to nonperfusion of the upper lung.

V. P.

#### A67-41654 #

##### ULTRASTRUCTURAL CHANGES IN RAT KIDNEY UNDER 100% OXYGEN - EFFECTS OF VITAMIN E DEPLETION.

D. B. Menzel, R. Hess, A. M. Shaw (California, University, Los Angeles, Calif.), and G. A. Brooksby (NASA, Ames Research Center, Moffett Field, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 303, 304. Abridged.

Grant No. NGR-05-003-090.

Investigation of the  $\text{O}_2$  inhibition of growth in rat-kidney tissue. The theory that increased  $\text{O}_2$  tensions result in an increased free-radical flux in the tissue, akin to ionizing radiation exposure, is explored. Rats are paired by initial weight, one of each pair being exposed to 600 mm Hg 100%  $\text{O}_2$ , and the other to air. Observations are consistent with the theory that 100%  $\text{O}_2$  results in an increased flux of free radicals in the tissue.

B. B.

#### A67-41655 #

##### UNDERCOOLING AND OVERCOOLING WITH LIQUID COOLING GARMENTS.

James F. Annis and Paul Webb (Webb Associates, Yellow Springs, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 305, 306. Abridged.

Discussion of six experiments in each of which four male subjects thermally isolated in an insulated impermeable clothing assembly (including a water-cooled undergarment covering 88% of the body surface) were subjected to work schedules consisting in marching on a treadmill with predetermined speed and grade to produce fixed levels of work. Heat removal was controlled so that the men stayed in a biothermal response zone between sweating and shivering. Since neither sweating nor shivering occurred in any of the experiments, and plots of the individual test parameters such as mean skin temperature ( $T_{sk}$ ), mean body temperature ( $T_b$ ), and rectal temperature ( $T_r$ ) show fairly even distribution on either side of the computed arithmetic mean for all subjects, it may be assumed that the mean represents fairly "correct" (constant total body heat content) cooling responses. In general, the results indicate that where working men are cooled well enough to prevent sweating or shivering, correct cooling is defined by a narrow band of biothermal response. Temporary overcooling or undercooling during transitions from rest to work can be recognized by a steep drop in  $T_{sk}$ , a rapid rise in  $T_r$ , and a substantial change in  $T_b$ , in the case of overcooling, and by a shallow drop in  $T_{sk}$ , a slow rise in  $T_r$ , and a small change in  $T_b$ , in the case of undercooling.

V. P.

#### A67-41656 #

##### UNUSUAL ASPECTS OF INDIGENOUS MICROFLORA AS DETERMINED IN MEN UNDERGOING SIMULATED SPACE CONDITIONS.

Diane Shoreinstein, Phyllis E. Riely, James D. Gatts (Fairchild Hiller Corp., Republic Aviation Div., Farmingdale, N.Y.), and Alton E. Prince (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04] Washington, D.C., American Medical Association, 1967, p. 307, 308. Abridged.

Study designed to determine the indigenous microflora of men and the changes occurring under altered conditions of environment and personal hygiene. The study is limited to three types of organisms encountered - the Corynebacteria, the Peptococci and the enteropathogenic E. coli. It is pointed out that the more fastidious and delicate organisms must be studied closely to evaluate their role in the body's ecology and that these organisms are essential when considering the potential "microbic shock," which is postulated on long-term missions.

M. F.

## A67-41657

### A67-41657 \* \*

THE USE OF SIMPLE PHYSIOLOGICAL MEASUREMENTS IN OBTAINING RELATIVE ENERGY EXPENDITURE AND WORKLOADS DURING A SIMULATED LUNAR SURFACE MISSION.

John E. Haaland (Honeywell, Inc., Aerospace and Defense Group, Systems and Research Div., Systems and Research Center, Minneapolis, Minn.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 309, 310. Abridged.

Contract No. NAS 8-20006.

Use of physiological measurements such as food and water intake, waste output, and the continuous telemetry of heart and respiratory rates to obtain information on the relative energy expenditure and task workload of calibrated personnel in a remote and hostile environment. The relationship of oxygen consumption and heart rate is graphed, and the mean heart-rate task profiles as a percent of maximum work are plotted. M.F.

### A67-41658 #

VEHICLE VOLUME AND DESIGN CRITERIA FOR MANNED LUNAR ROVING VEHICLES.

Neal M. Burns, Lorenz P. Schrenk, and John E. Haaland (Honeywell, Inc., Aerospace and Defense Group, Systems and Research Div., Systems and Research Center, Minneapolis, Minn.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 311. Abridged.

Measurements of the performance of two subjects carrying out representative scientific and mission-oriented tasks during an 18-day simulated lunar surface mission. Driving, monitoring, navigation, sample measurement and audio balancing tasks were performed, and pre- and postsimulation physical fitness was evaluated. No adverse trends or marked irregularities were noted in the performance data of either subject throughout the 18-day simulation. M.F.

### A67-41659 #

VESTIBULARLY DRIVEN HEAD MOVEMENTS IN MAN.

G. Melvill Jones (McGill University, Dept. of Physiology, Aviation Medical Research Unit, Montreal, Canada) and J. S. Outerbridge.

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 312, 313. Abridged.

Canadian Defence Research Board Grant No. 9910-37.

Study of experiments showing that involuntary vestibularly driven head movements occur in man during rotational simulation. Three lines of evidence are presented which point to the conclusion that an active vestibulo-colic reflex operates in man and is capable of producing a significant reduction in the effect of If canal errors on visual stabilization. The presence of this reflex may contribute to the unconscious tendency of a pilot to maintain a fixed attitude of the head with respect to the horizon during rolling maneuvers in flight. M.F.

### A67-41660 #

THE VIBROCARDIOGRAM AS A CARDIOVASCULAR MONITOR.

Clarence M. Agress and Stanley Wegner (Cedars-Sinai Medical Research Institute, Los Angeles, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 314, 315. Abridged.

Description of a simple external technique for measuring cardiac events from vibrations obtained with a microphone from the chest wall. The technique permits a prediction of the maximum rate of ventricular pressure change and the left ventricular stroke volume. These functions can be obtained continuously on a beat-to-beat basis from the vibrocardiogram (VbCg) under static conditions and under conditions of minimum subject motion. Application of signal-averaging methods permits the evaluation of these parameters during severe subject stress. Because of instrumentation simplicity and a wide information capability this VbCg technique is especially suitable for continuous cardiovascular monitoring in stress environments and in acutely ill patients. V.Z.

### A67-41661 \* #

VIBROPHONOCARDIOGRAPH INVESTIGATION AND DEVELOPMENT STUDY.

D. M. Walton, P. R. Barker, L. N. Wright, R. L. Randall, and J. T. Celentano (North American Aviation, Inc., El Segundo, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 316, 317. Abridged.

Contract No. NAS 4-1043.

Development of a vibrophonocardiograph system for use in a shirt-sleeve flight environment. The system represents a miniaturization of a previous NAA design accomplished without sacrificing performance characteristics. Its usefulness as an effective indicator of cardiac mechanical activity and as a means of estimating stroke volume is investigated. V.Z.

### A67-41662 #

WORK PHYSIOLOGICAL ELEMENTS IN THE ANALYSIS OF THE WORK POTENTIAL OF MAN.

W. Kuehnegger (Kaman Work Sciences Laboratory).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 318-320. Abridged.

Discussion of the work physiological elements in terms of the methodology adopted at the Kaman Work Sciences Laboratory in the determination of man's physical capabilities and work potential. An attempt is made to obtain a fuller insight into the physiological energy distribution of man by an analysis of these elements defined as the metabolic, respiratory, cardiovascular, thermoregulatory, neuromuscular, endocrine, and skeletal systems. Their investigational parameters and responses to work stresses are considered. V.Z.

### A67-41663 #

THE WORK-REST CYCLE IN AIRCREWMEN FATIGUE.

Roy L. DeHart (USAF, Logistics Command, Office of the Surgeon, Wright-Patterson AFB, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM. [A67-41534 23-04]

Washington, D.C., American Medical Association, 1967, p. 321, 322. Abridged.

Study of the subjective effects of fatigue in the crew members of an operational Air Force squadron in terms of their daily activity as expressed in the work-rest cycle. The study ran for one month and covered 715 days of subjective data. A decreased desire to eat while flying, fluctuations in sexual desire, an increase in both coffee consumption and cigarette smoking, and fluctuations in daily evaluation scores of operational activities are noted. V.Z.

**A67-41693****EVALUATION OF POTENTIAL DECOMPRESSION HAZARDS IN SMALL PRESSURIZED AIRCRAFT**

John J. Swearingen (Federal Aviation Administration, Aeromedical Service, Civil Aeromedical Research Institute, Oklahoma City, Okla.).

Aerospace Medicine, vol. 38, Oct. 1967, p. 987-992.

More than 300 decompression tests have been conducted to determine potential hazards of ejection or incapacitating or fatal head injuries in small volume pressurized aircraft in the event of sudden decompression following the loss of a window, emergency exit, door, or windshield. Evaluations were made to determine the relationships of cabin volume (100 to 700 ft<sup>3</sup>), window area (100 to 900 in.<sup>2</sup>), pressure differential (5 to 9 psi), body weight and size (13 to 180 lb) and relative distance from the opening in terms of ejection and head impact injuries. Summary graphs and charts are presented showing which test configurations resulted in ejections or dangerous head impacts.

(Author)

**A67-41694****NIGHT VISION AND MILD HYPOXIA.**

William R. Pierson (Lockheed Aircraft Corp., Lockheed-California Co., Human Engineering Dept., Burbank, Calif.).

Aerospace Medicine, vol. 38, Oct. 1967, p. 993, 994. 9 refs.

Ten male subjects were tested for absolute brightness thresholds and reading ability (the latter by Hypoxia Demonstration Chart) while breathing 100% oxygen and while breathing air at ground level (1310 ft) and at a simulated 8000-ft altitude. Oro-nasal masks were worn in both instances. They also were tested at a simulated altitude of 9300 ft without oro-nasal masks. The tests were administered at ground level before each "flight," at altitude, and immediately after descent. The results indicate that brightness thresholds and Hypoxia Demonstration Chart scores are not significantly affected by the oxygen tensions encountered at altitudes of 8000 and 9300 ft or by the use of supplemental oxygen at these altitudes.

(Author)

**A67-41696****RELATION OF TIME BETWEEN FLIGHTS TO THE ACCIDENT POTENTIAL OF CENTURY SERIES PILOTS.**

Ancard F. Zeller and Jourdan M. Burke (USAF, Systems Command, Life Sciences Div., Norton AFB, Calif.).

Aerospace Medicine, vol. 38, Oct. 1967, p. 998-1001.

This study evaluates the relation between aircraft accidents and the time lapse between flights. Accidents involving 204 USAF pilots of "Century Series" fighter aircraft were studied. In addition, two control groups, each containing 204 comparable nonaccident pilots, were used for comparison. The groups were carefully matched for kind of flying, age, date of graduation, and experience. Although it has been almost universally accepted that there is a relationship between the time between flights and accidents the current evaluation failed to offer any support for this hypothesis. There are various suggested reasons for this, one which appears probable is that pilots acutely aware of their lowered proficiency following lapses in flying compensate or even overcompensate in order to avoid situations which would involve them in accidents. The study suggests that there is not as clear cut a relation, within the time limits studied, of accidents and time between flights as has been assumed.

(Author)

**A67-41697 \*****EFFECT OF ISOLATION IN A CONSTANT ENVIRONMENT ON PERIODICITY OF PHYSIOLOGICAL FUNCTIONS AND PERFORMANCE LEVELS.**

Karl E. Schaefer, Bruce R. Clegg, Charles R. Carey, James H. Dougherty, Jr., and Benjamin B. Weybrew (U.S. Navy, Bureau of Medicine and Surgery, Naval Submarine Medical Center, Groton, Conn.).

Aerospace Medicine, vol. 38, Oct. 1967, p. 1002-1018. 31 refs. NASA Contract No. R-24.

Study of the effect of isolation in a constant environment on the circadian cycles of physiological functions and the performance levels. Two students were isolated in a constant environment during a four-day control period, nine days of isolation, and a three-day recovery period. They were of different body build and demonstrated different personality traits. The effect of isolation on subjective experiences, the sleep/wakefulness cycles and cycles of physiological functions, the periodicities of those functions, the amplitudes of circadian cycles, and performance-test scores is discussed.

M. F.

**A67-41698****HUMAN CIRCULATION TIMES DURING WEIGHTLESSNESS PRODUCED BY PARABOLIC FLIGHT.**

Bruce H. Warren (USAF, Systems Command, Aerospace Medical Div., Brooks AFB, Tex.).

Aerospace Medicine, vol. 38, Oct. 1967, p. 1019, 1020. 12 refs.

Arm-to-lung and arm-to-tongue circulation times of human subjects flying in the rear cockpit of NF 100F fighter-bombers were determined during parabolic flight maneuvers which produced 45 sec of weightlessness. Control circulation times were determined on the ground prior to each experimental flight. Modifications of the ether-saline arm-to-lung circulation time test of Hitzig and the decholin arm-to-tongue circulation time test of Winternitz, et al., were used in these experiments. The mean value of the control arm-to-lung circulation times was 6 sec and the mean value during weightlessness was 6.7 sec. The mean value of the control arm-to-tongue circulation times was 10.8 sec and the mean value during weightlessness was 11 sec. The results of these experiments support the assumption made in other experiments that macroaggregated human albumin labeled with radioactive iodine would have sufficient time to reach the lungs during weightlessness when injected into an upper arm vein 20 sec after entry into a 45-sec parabola.

(Author)

**A67-41699 #****HIGH VENOUS PRESSURES DURING EXPOSURE OF DOGS TO NEAR-VACUUM CONDITIONS.**

Julian P. Cooke, Stephen M. Cain, and Richard W. Bancroft (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Branch, Brooks AFB, Tex.). (Aerospace Medical Association, Annual Meeting, 38th, Washington, D.C., Apr. 10-13, 1967, Paper.)

Aerospace Medicine, vol. 38, Oct. 1967, p. 1021-1024. 16 refs.

During a 2-min exposure of five anesthetized dogs to the near-vacuum condition of about 1 mm Hg absolute, mean venous pressure values equilibrated with arterial in less than 20 sec. Average venous pressures were more than 10 mm Hg higher after 30 sec exposure, 15 mm Hg following 1 min, and more than 20 mm Hg higher than arterial by the end of the 2-min exposure. Following euthanasia and then decompression, higher venous pressures were also obtained in the dead animals, reaching a maximum difference of about 15 mm Hg within 30 sec and then returning to an approximate equilibrium with the arterial pressure during the following 90 sec. In both living and dead animals, it is believed that the various compartments of the vascular system allow for these different pressures and that the greater amount of evolved gas and water vapor in the large volume of venous blood account for these pressure differences. No evidence of a reversal of blood flow has been measured in the living animals during the 2-min exposure, and no deaths have been directly attributed to this inverted pressure relationship. (Author)

**A67-41700 #****PERIPHERAL VENOUS RENIN LEVELS DURING +G<sub>z</sub> ACCELERATION.**

James D. Rogge, A. F. Fasola, and B. L. Martz (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Biodynamics Branch, Brooks AFB, Tex.; Marion County General Hospital, Lilly Laboratory for Clinical Research, Indianapolis, Ind.).

Aerospace Medicine, vol. 38, Oct. 1967, p. 1024-1028. 32 refs.

## A67-41701

Renin secretion, as measured by changes in peripheral venous renin levels, was used to evaluate the part played by the renin-angiotensin system in the response to  $+G_z$  acceleration. Centrifuge runs were done on the USAF SAM Human Centrifuge and the subjects were members of the USAF SAM Acceleration/Deceleration Panel. A larger increase in the renin level was found each time the run duration was increased at  $+2 G_z$ . The mean increase in the 20-min samples was 0.36 ng/ml ( $p < 0.05$ ) and in the 30-min samples was 0.76 ng/ml ( $p < 0.01$ ). A mean rise of 0.63 ng/ml, found after 30 min at  $+2 G_z$  while wearing an anti-G suit, was not significantly different from the rise found in the 30-min runs without the G-suit. The renin-angiotensin system may play a part in the response to  $+G_z$  acceleration, either alone or in conjunction with the autonomic nervous system. (Author)

## A67-41701

ANALYSIS OF USAF UNDERSHOOT AND OVERSHOOT ACCIDENTS - 1960-1964.

Charles H. Sawyer and Anchar F. Zeller (USAF, Systems Command, Life Sciences Div., Norton AFB, Calif.).

Aerospace Medicine, vol. 38, Oct. 1967, p. 1029-1033.

Examination of the undershoot and overshoot experience of the Air Force, determination of the relative frequency and historical trends of these accidents, and evaluation of the associated variables in terms of aircraft characteristics, facility improvements, and the human factors. The Air Force experience for the calendar years 1960 through 1964 was utilized. R. B. S.

## A67-41702 #

TREATMENT OF DECOMPRESSION SICKNESS IN SIMULATED SPACE FLIGHT.

Robert G. McIver, Sarah E. Beard, Richard W. Bancroft, and Thomas H. Allen (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Branch, Brooks AFB, Tex.).

(Aerospace Medical Association, Annual Meeting, 38th, Washington, D.C., Apr. 11, 1967, Paper.)

Aerospace Medicine, vol. 38, Oct. 1967, p. 1034-1036. 9 refs.

Investigation of the general procedures and duration of treatment for the relief of altitude decompression sickness with respect to operations requiring extravehicular activity (EVA). The time required for complete recovery before a subsequent EVA can be made without recurrence is determined. Symptoms, time of onset, and the results of treatment of individuals who experienced bends while exercising in "shirtsleeve" oxygen at 3.5 psi are presented in tabular form, as well as the frequency of recurrence of bends during a second EVA preceded by a symptomless period. Also included are data concerning the effect of treatment for four hours at various pressures and gas composition on the average-bends score in the second EVA as opposed to the first, and the influence of individual body fat-to-lean ratio on pressure needed for reported relief of symptoms. Oxygen at the maximum pressure available is recommended for treatment of decompression sickness suffered during EVA. R. B. S.

## A67-41703 #

STUDY OF MAN DURING A PROLONGED EXPOSURE TO OXYGEN AT 258 mm. Hg TOTAL PRESSURE - SUPPLEMENTAL BIO-CHEMICAL MONITORING.

M. J. Bartek, Ann J. Roberts, and Frode Ulvedal (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.).

Aerospace Medicine, vol. 38, Oct. 1967, p. 1037-1040. 19 refs.

The effect of a slightly hyperoxic environment composed of 100% oxygen at 258 mm Hg total pressure on certain blood constituents was studied in conjunction with a recent trace contaminant experiment. Four healthy males were maintained in this atmosphere for 21 days, and the following measurements were made on their blood three times weekly: total serum lactic dehydrogenase and its isozymes, hematocrit, erythrocyte glucose-6-phosphate dehydrogenase, reduced glutathione and glutathione stability. A 17.2% decrease in total lactic dehydrogenase and a relative increase of 31.7% in the third isozyme were observed in the chamber group.

In addition to a 9% decrease in hematocrit, a slight elevation of glucose-6-phosphate dehydrogenase was seen during the altitude phase along with a slight upward trend in reduced glutathione. Little if any evidence for increased instability of glutathione was observed. Minor changes in these blood volumes, if attributable to the hyperoxic environment, were not magnified by the presence of trace contaminants. (Author)

## A67-41704 #

CINERADIOGRAPHIC ANALYSIS OF HUMAN VISCERAL RESPONSES TO SHORT DURATION IMPACT.

Edmund B. Weis, Jr. and George C. Mohr (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

Aerospace Medicine, vol. 38, Oct. 1967, p. 1041-1044. 7 refs.

USAF-supported research.

A series of experiments are reported in which human volunteers are exposed to impacts of less than 10-msec duration and velocity change of up to 2.44 m/sec. Cineradiographic analysis (60 frames/sec) of the resulting motion is reported. The implications of the results of this analysis and correlations in animal experiments are discussed. (Author)

## A67-41705 \*

WATER VAPOR ELECTROLYSIS.

T. Wydeven and E. Smith (NASA, Ames Research Center, Moffett Field, Calif.).

Aerospace Medicine, vol. 38, Oct. 1967, p. 1045-1048. 6 refs.

A matrix of sulfuric acid and silica gel was used successfully in an experimental water-vapor electrolysis cell. No apparent degradation of the electrolyte or gel matrix occurred during 1000 hr of electrolysis. Mass spectrometric analysis of the oxygen and hydrogen generated in the cell did not reveal any gaseous sulfur compounds which might have arisen from electrolyte degradation. A microporous polyvinylchloride membrane was used reliably in the experimental vapor cell to prevent intermixing of the oxygen and hydrogen gases. It was found that as much as 41% of the water vapor entering the cell was absorbed and electrolyzed in one pass through the cell. The sulfuric acid and silica-gel matrix, with a polyvinylchloride membrane as a gas separator, operates at a lower overvoltage than similar water-vapor electrolysis cells that employ a matrix of phosphoric acid, asbestos, and hard rubber. The electrolysis power required to generate 2 lb of oxygen per day (one man's requirement) is 279 watts. Similar phosphoric acid cells require about 337 watts. (Author)

## A67-41706 #

EFFECT OF CHEMICALLY INERT GASES ON OXYGEN CONSUMPTION IN LIVING TISSUES.

Domenic A. Maio and J. Ryan Neville (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Branch, Brooks AFB, Tex.).

Aerospace Medicine, vol. 38, Oct. 1967, p. 1049-1056. 8 refs.

The effect of  $N_2$ , He, and A at normal pressures (~560 mm Hg) on the oxygen consumption of yeast cells, rat liver slices, and rat liver homogenates was studied. Utilizing both polarographic and Warburg techniques, comparisons were made between 20%  $O_2$ -80% inert gas mixtures and 100%  $O_2$ . A consistent but small depression of oxygen consumption of yeast in the presence of inert gases was noted with the dropping mercury electrode. No effect of changing oxygen tension was apparent except below the critical oxygen tension (4 or 5 mm Hg). With the Warburg technique, oxygen consumption of liver slices in inert gas mixtures was found to decrease as much as 60% compared to pure oxygen controls. Small but apparently insignificant differences in this depressive effect were noted between the inert gases. Manipulation of both shaking rate and temperature indicated that physical diffusion of oxygen was not a limiting factor. The rate of oxygen consumption by rat liver slices was found to be a constant regardless of oxygen tension throughout the range studied. Homogenates of rat liver tissue failed to display this depression in the presence of inert gas, oxygen consumption being identical to the

pure oxygen controls. This would seem to indicate that the site of the depressant action may be in the cell membrane and that the inert gas may possibly act on a membrane mechanism for oxygen transport into the cell.

(Author)

#### A67-41707

##### DEATH AND SURVIVAL DURING WATER IMMERSION - ACCOUNT OF PLANE CRASHES NEAR CAPE COD AND HAMILTON BAY.

Marlin B. Kreider (U.S. Army, Research Institute of Environmental Medicine, Physiology-Medicine Div., Natick, Mass.).

*Aerospace Medicine*, vol. 38, Oct. 1967, p. 1060-1062. 8 refs.

Review of data derived from reasonably clear accounts of the experience of three survivors of a plane crash into the Atlantic Ocean off Cape Cod, supplemented by the account of one of two survivors of a crash into Hamilton Bay, Calif. Only three of twelve airmen who initially survived the crash landing off Cape Cod were rescued alive after immersion in water at 11°C for 10-1/2 hr. The causes of death may have been hypothermia or drowning. Unconsciousness, occurring from one or several possible causes, led to drowning in at least one case when the man's face was inadequately protected from the water. The survival of a second man 2 hr after becoming unconscious suggests that unconsciousness in cold water immersion may not be caused by hypothermia alone. The importance in survival of face protection, large body size, and the insulation of the antiexposure suits are stressed.

P. v. T.

#### A67-41708

##### HUMAN FACTORS IN GENERAL AVIATION ACCIDENTS.

J. Robert Dille and Edward W. Morris (Federal Aviation Administration, Los Angeles, Calif.).

*Aerospace Medicine*, vol. 38, Oct. 1967, p. 1063-1066. 6 refs.

Discussion of 122 fatal general aviation accidents in the Western Region during the twelve months ending Oct. 31, 1965. No accidents were found to be definitely due to medical conditions. Twenty-five victims wore corrective lenses, and twenty had other recorded physical defects. The relationships of experience, occupation, local reputation and time of day to alcohol involvement are discussed. Carbon monoxide, agricultural chemicals, and fatigue are among other causes found for fatal accidents.

P. v. T.

#### A67-41709

##### RESTORATION OF CARDIOVASCULAR INTEGRITY IN POST MYOCARDIALLY-INFARCTED AVIATION PERSONNEL.

Michael T. Lategola and John Naughton (Federal Aviation Administration, Aeromedical Service, Civil Aeromedical Research Institute, Physiology Laboratory; Oklahoma, University, Medical Center, Dept. of Medicine and Dept. of Physiology, Oklahoma City, Okla.).

*Aerospace Medicine*, vol. 38, Oct. 1967, p. 1067-1070. 19 refs. FAA-supported research; PHS Grants No. HE-06286-06; No. 1-K3-HE-31; No. 272-01; No. CD-00170-02.

Description of the histories of two airmen who experienced clinically-documented episodes of myocardial infarction and who regained their flying status after approximately two years participation in a study of the feasibility of cardiovascular rehabilitation in aviation personnel. Physiological measurements for this two-year period and an additional year in the program reveal strong evidence for the attainment and maintenance of a relatively high level of physical competence. For both these subjects, their present levels of physical competence exceed not only their levels before their heart attacks, but also that of the average, age-matched American male.

P. v. T.

#### A67-41781 #

##### THE EFFECTS OF THREE LEVELS OF HYDRATION ON THERMAL SWEATING.

J. R. Allan and R. A. Mantle (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).

*Aerospace Medical Association, Annual Scientific Meeting, Washington, D.C., Apr. 10-13, 1967, Paper. 2 p. 9 refs.*

Experimental investigation in which the sweating response to a standard heat stress was measured on one subject under three conditions of hydration: (1) normally hydrated, (2) with a 2% water deficit, and (3) with a 3% water deficit. The results of the standard sweat-rate measurements for normal hydration show a variable but small reduction in sweat loss during the afternoon test, the average reduction being 6% of the morning rate. Two and three percent water deficits produced reductions in sweating which averaged 18% and 36% of the respective morning rates. It would appear that the combined effects of higher body temperature and sweat reduction due to wet skin lead to an underestimate of the effects of water deficit of approximately 30% when these are assessed during conventional heat exposures.

M. M.

#### A67-41782 #

##### SIMULATION OF THE IMPEDANCE OF THE HUMAN RESPIRATORY SYSTEM IN DYNAMIC TESTING OF AIRCRAFT BREATHING EQUIPMENT.

K. R. Maslen and G. F. Rowlands (Ministry of Technology, Royal Aircraft Establishment, Farnborough, Hants., England).

*Aerospace Medical Association, Annual Scientific Meeting, Washington, D.C., Apr. 10-13, 1967, Paper. 2 p.*

Description of a breathing simulator for routine testing of aircraft breathing equipment which has the same impedance as the human respiratory system. Tests were carried out with an experimental miniature regulator and system. This system had a continuous instability at 15 cps in nose breathing, and was intermittently unstable at the same frequency, or unstable at 8 cps in mouth breathing. Using the simulator with a resistance of 6 gm/sec-cm<sup>4</sup>, the 15 cps instability was reproduced, and using a resistance of 1.5 gm/sec-cm<sup>4</sup>, instabilities ranging in frequency from 8 to 10 cps occurred, showing that the higher resistance simulated nose breathing, while the lower resistance simulated at least some types of mouth breathing. The validity of the simulation has been established at the lower end of the frequency range, but not yet at the upper end.

M. M.

#### A67-41801

##### SODIUM AND WATER EXCRETION AND RENAL HEMODYNAMICS DURING LOWER BODY NEGATIVE PRESSURE.

Charles A. Gilbert, Lee A. Bricker, W. Thaxton Springfield, Jr., Paul M. Stevens, and Bruce H. Warren (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Internal Medicine Branch and Biodynamics Branch, Brooks AFB, Tex.).

*Journal of Applied Physiology*, vol. 21, Nov. 1966, p. 1699-1704.

31 refs.

(SAM-TR-65-329)  
Zero gravity conditions such as occur in orbital space flight are known to produce significant losses of body fluid and electrolyte. Lower body negative pressure (LBNP) applied to the supine subject has been suggested as a possible preventive measure. The present study demonstrated that 60 mm Hg LBNP applied for 1 hr produced moderate declines in glomerular filtration rate, renal plasma flow, and tubular reabsorption of sodium, with marked falls in rate of urine flow, free water clearance, and sodium excretion. Although antidiuretic hormone and salt-retaining hormones may have played a role in the responses seen, the changes which occurred in sodium and water excretion appear explainable primarily on the basis of diminished glomerular filtration rate. It is concluded that LBNP is a potent stimulus to retention of salt and water and therefore has a potentially valuable place in maintaining or restoring plasma volume during prolonged weightlessness.

(Author)

#### A67-41802 #

##### TISSUE OXYGENATION DURING HEMORRHAGE IN DOGS BREATHING 1 AND 3 ATMOSPHERES OF OXYGEN.

Stephen M. Cain and John M. Connolly (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Branch and Experimental Surgery Branch, Brooks AFB, Tex.).

*Journal of Applied Physiology*, vol. 22, Feb. 1967, p. 255-259.

14 refs.

(SAM-TR-66-258)

## A67-41809

Description of the bleeding of two groups of eight dogs to 50 mm Hg mean arterial blood pressure after making control measurements while both groups breathed oxygen at ambient pressure. The tests were made to determine whether oxygen at high pressure (OHP) really benefits tissue oxygenation during hemorrhagic shock. One group remained at ambient pressure; the other was subjected to a pressure of 3 atm. Experimental samples were taken after 1 hr of hemorrhagic shock, and it is concluded that without other treatment to support perfusion, OHP does not prevent the stagnant hypoxia of hemorrhagic shock. B.B.

## A67-41809

FACTORS IN RECOVERY FROM PERFORMANCE DECREMENT - ACTIVATION, INHIBITION AND WARM-UP.

John F. Catalano and Patricia M. Whalen (U.S. Navy, Office of Naval Research, Naval Training Devices Center, Orlando, Fla.). *Perceptual and Motor Skills*, vol. 24, 1967, p. 1223-1231. 11 refs. (NAVTRADEVEN-IH-72)

It has been recently found that rotary pursuit tracking performance can be enhanced as a result of inducing muscular tension by requiring individuals to squeeze a dynamometer as an interpolated activity between tracking trials. The present experiment was designed to determine whether such enhancement would result if the tension inducing activity utilized the same muscular movements as those involved in the rotary pursuit task. In the main condition, subjects were required to overcome 3 in.-lb of resistance in order to turn a disk at 60 rpm. This interpolated activity significantly enhanced reminiscence beyond that following rest alone. No enhancement occurred in a control condition when there was no resistance to overcome. Another condition in which muscular tension was induced by turning the disk in a direction opposite to that of the pursuit rotor target resulted in an enhancement of reminiscence. A final tension inducing condition in which the disk was turned with the nontracking hand produced a bilateral enhancement effect. It was generally found that those individuals with the greatest amount of performance decrement tended to show the greatest enhancement. The results of the study were viewed as additional evidence of the influence of changes in activation level upon efficiency of performance. (Author)

## A67-41841 #

STUDIES ON THE MECHANISM OF SUBSTRATE PROTECTION OF ENOLASE AND LACTIC DEHYDROGENASE AGAINST IONIZING RADIATION.

Jack A. Winstead and Arthur E. Gass, Jr. (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Radiobiology Branch, Brooks AFB, Tex.).

*Radiation Research*, vol. 30, Feb. 1967, p. 208-216. 12 refs. (SAM-TR-66-264)

Investigation of the protective effect of substrates against ionizing radiation, using beef-heart LDH (lactic dehydrogenase) and rabbit-muscle enolase. The substrate of enolase was found to be a protective agent, but the protection occurred in the absence of Mg ions, which are required to bind the substrate molecule to the enzyme. In these experiments, the substrate of enolase also protected LDH molecules. It was found that nicotinamide adenine dinucleotide (NAD) and reduced nicotinamide adenine dinucleotide (NADH) gave better protection to enolase than to LDH. On the basis of the experimental results, it is concluded that specific substrate protection is not the primary mechanism involved. It is suggested that the protection is due to a radical-scavenger mechanism. M.M.

## A67-41842 #

PROBLEM OF SENSORY DEPRIVATION IN SPACE MEDICINE [PROBLEMA SENSORNOI DEPRIVATSII V KOSMICHESKOI MEDITSINE].

F. P. Kosmolinskii.

*Kosmicheskaya Biologiya i Meditsina*, vol. 1, July-Aug. 1967, p. 3-11. 48 refs. In Russian.

Review of Soviet and foreign literature on sensory deprivation as it applies to space medicine. A study is made of the changes

in the irritation spectrum taking place under space-flight conditions (both qualitatively and quantitatively) which lead to fluctuations of the loads acting on the afferent portion of the nervous system. It is seen that experimental confinement and isolation can lead to pathological changes in the psychic processes of test subjects, while in simulated space flights where the crew members are engaged in purposeful activities only functional and transient changes have been observed. V. P.

## A67-41843 #

EXTRALABYRINTHINE SYMPTOMS OF MOTION SICKNESS UNDER SPACE-FLIGHT CONDITIONS [OB EKSTRALABIRINTNYKH SIMPTOMAKH UKACHIVANIYA V KOSMICHESKOM POLETE].

I. M. Khazen.

*Kosmicheskaya Biologiya i Meditsina*, vol. 1, July-Aug. 1967, p. 11-18. 56 refs. In Russian.

Critical analysis of theories according to which the vestibular apparatus plays a dominant role in the genesis of space-motion sickness. Nervous and humoral mechanisms of extralabyrinthine effects on the development of vegetative disturbances during exposure of the human organism to space-flight factors are examined on the basis of experimental data. It is seen that in the mechanism of the genesis of extralabyrinthine symptoms of space-motion sickness a significant role is played by the disruption of reflex bonds between the various parts of the gastrointestinal tract and between the latter and the vegetative regulation centers. V. P.

## A67-41844 #

ALGAL CONTINUOUS CULTURE AS A COMPONENT OF THE CLOSED ECOLOGICAL SYSTEM [NEPRERYVNAIA KUL'TURA MIKROVODOROSLEI V KACHESTVE ZVENA ZAMKNUTOI EKOLOGICHESKOI SISTEMY].

L. V. Kirenskiy, I. A. Terskov, I. I. Gitel'zon, G. M. Lisovskii, B. G. Kovrov, and Yu. N. Okladnikov.

*Kosmicheskaya Biologiya i Meditsina*, vol. 1, July-Aug. 1967, p. 19-22. 9 refs. In Russian.

It is recommended to use a continuous culture of unicellular algae grown at a constant density of the suspension as an autotrophic component of the closed ecological system. It is shown that under such conditions the stabilized concentration of the culture biomass causes a stability of every chemical parameter of the medium and cultivation productivity. An experimental cultivator with an automatic stabilization of the biomass concentration and culture temperature has been designed to provide oxygen requirements of a single man. It is demonstrated that the efficiency with which the algal culture can utilize solar and artificial light is similar. (Author)

## A67-41845 #

GAS EXCHANGE BETWEEN MAN AND A MICROALGAE CULTURE DURING A 30-DAY EXPERIMENT [GAZOOBMEN MEZH DU CHELOVEKOM I KUL'TUROI MIKROVODOROSLEI V 30-SUTOCHNOM EKSPERIMENTE].

L. V. Kirenskiy, I. A. Terskov, I. I. Gitel'zon, G. M. Lisovskii, B. G. Kovrov, F. Ia. Sid'ko, Yu. N. Okladnikov, M. P. Antoniuk, V. N. Belianin, and M. S. Rerberg.

*Kosmicheskaya Biologiya i Meditsina*, vol. 1, July-Aug. 1967, p. 23-28. In Russian.

Discussion of an experiment involving the biological regeneration of an enclosed atmosphere with the aid of algae photosynthesis. It is demonstrated that man and unicellular algae (*Chlorella vulgaris*) are biologically compatible and that their gas metabolites produce no toxic effect either on man or on the algae. An observed discrepancy between the assimilation coefficient of algae and the respiration coefficient of man can be eliminated by changing the diet of the test subjects. V. P.

## A67-41846 #

LONG-TERM CULTIVATION OF CHLORELLA WITH DIRECT RECOVERY OF THE MEDIUM [DLITEL'NOE KUL'TIVIROVANIE KHLORRELLY S PRIAMYM VOZVRATOM SREDY].

G. I. Meleshko, E. K. Lebedeva, O. A. Kurapova, and Iu. N. Ul'ianin.

*Kosmicheskaya Biologiya i Meditsina*, vol. 1, July-Aug. 1967, p. 28-32. 6 refs. In Russian.

Description of a method of long-term cultivation of *Chlorella* which is free of the drawbacks typical of the classical continuous cultivation method and has certain advantages over the batch culture method. By providing recovery of the medium, the method makes it possible to remove nonsoluble products of algal and bacterial cell dissociation from the suspension, while at the same time stabilizing the content of soluble organic substances without impairing the production rate.

V. P.

#### A67-41847 #

MEASUREMENT OF THE BIOLOGICAL VALUE OF ALGAL AND SOYA PROTEINS ON WHITE RATS OF FOUR GENERATIONS [OPREDELENIE BIOLOGICHESKOI TSENNOSTI BELKOV ODNOKLETCHNYKH VODOROSLEI I SOI NA 4 POKOLENIIAKH BELYKH KRYSI].

N. S. Kliushkina, V. I. Fofanov, and I. T. Troitskaia.

*Kosmicheskaya Biologiya i Meditsina*, vol. 1, July-Aug. 1967, p. 33-35. In Russian.

White rats of four generations were used to study the effect on the animal organism of the diet with a decolorized biomass of unicellular protozoal algae and soya bean flour as the only protein source. The diet contained 18% proteins. Algal proteins showed a high biological value. Test animals exhibited no significant changes in the concentration of amine nitrogen in the urine, nitrogen balance, content of nitrogen and fat in the liver and concentration of albumins in the blood as compared with control rats (fed caseine-containing diets). The biological values of soya proteins appeared to be considerably lower than that of algal ones.

(Author)

#### A67-41848 #

EXPERIMENTAL PROCEDURE FOR STUDYING REFLEX INTERACTIONS OF ANALYZER SYSTEMS [METODIKA EKSPERIMENTAL'NOGO IZUCHENIYA REFLEKTORNOGO VZAIMODEISTVIA ANALIZATORNYKH SISTEM].

Z. Novotnyi.

*Kosmicheskaya Biologiya i Meditsina*, vol. 1, July-Aug. 1967, p. 36-40. 6 refs. In Russian.

Description of an equipment and procedure for studying problems associated with disorders in space perception. By using this procedure, it is also possible to produce an illusion of a position of the body (as experienced by astronauts) under laboratory conditions and to study the effect of various analyzers on it by stimulating the first and second signaling systems. The equipment is an unstable platform representing a combination of the Soviet "rocking chair" device and an equipment developed by Chodera to study the conditioned falling reflex. The equipment proposed can also be used to simulate some aspects of horizontal flight.

V. P.

#### A67-41849 #

ON THE REACTIVITY AND RESISTANCE OF WARM-BLOODED ANIMALS [K PROBLEME REAKTIVNOSTI I REZISTENTNOSTI TEPLOKROVNYKH ZHIVOTNYKH].

L. L. Marfina.

*Kosmicheskaya Biologiya i Meditsina*, vol. 1, July-Aug. 1967, p. 40-47. 19 refs. In Russian.

Studies on the resistance of rats in the hypothermal state to very low atmospheric pressure were performed. The hypothermal state was provided either by an exposure of animals to increasing hypercapnia-hypoxia (cooling to 32-16°C) or by their premedication with lytic mixtures (cooling to 21-18°C). The total time of the ascent, plateau and descent of rats in the altitude chamber was 15 min. The reduction of the reactivity of animals was accompanied by a significant increase of their resistance to hypoxic hypoxia. No noticeable difference in the animal resistance during hypothermia attained by the two methods was observed. The rats that were fixed when exposed to hypoxic hypoxia showed a slightly decreased resistance, though the general trend towards an increase of resistance in relation to the degree of hypothermia remained unaltered.

(Author)

#### A67-41850 #

ON THE REACTIVITY OF ANIMALS TO CAFFEINE AND STRYCHNINE DURING TRANSVERSE ACCELERATION AFTEREFFECTS [O REAKTIVNOSTI ZHIVOTNYKH K KOFEINU I STRIKHNINU V PERIOD POSLEDEISTVIA POPERECHNONAPRAVLENNYKH PEREGRUZOK].

V. E. Belai, P. V. Vasil'ev, G. D. Glod, and M. I. Briuzgina.

*Kosmicheskaya Biologiya i Meditsina*, vol. 1, July-Aug. 1967, p. 47-53. 27 refs. In Russian.

Chronic experiments on rabbits and dogs were performed to study peculiarities of the pharmacological action of caffeine and strychnine during transverse acceleration aftereffects. The experiments revealed a decrease of the stimulant effect of the analeptics on the cardiac activity and respiration 5 to 25 min after an exposure of animals to accelerations. They also showed a reduction of the stimulant effect of strychnine on the rate of spinal reflexes. Proceeding from these data, it may be concluded that normalization of ECG and respiratory indices used as indicators of the animal tolerance to accelerations cannot give evidence for a complete functional recovery of the animal organism.

(Author)

#### A67-41851 #

ON DEOXYGENATION OF THE ANIMAL BODY EXPOSED TO AN ALTITUDE [O DEZOKSIGENATSII ORGANIZMA PRI POD'EME NA VYSOTU].

E. A. Kovalenko.

*Kosmicheskaya Biologiya i Meditsina*, vol. 1, July-Aug. 1967, p. 53-61. 12 refs. In Russian.

Experiments were performed on 21 dogs given a low barbamy anesthesia. The values of  $pO_2$ ,  $pCO_2$  and pH in the arterial and venous blood of the brain and in the mixed venous blood of the right heart were measured during an exposure of animals to simulated altitudes of 4, 6, 8, 10 and 12 km. Apart from that, ECG, respiration rate and EEG of the brain cortex and subcortex were recorded. Ascents to altitudes of 8 km and higher at a rate of 20 m/sec caused a faster and greater decrease of  $pO_2$  in the arterial blood than in the brain venous blood and in the mixed venous blood. This indicates the development of an altered gas exchange process which is termed deoxygenation of the body. The process promotes a distinct acceleration of acute hypoxic hypoxia at an altitude in contrast to other forms of oxygen deficiency observed at sea level. Calculations related to the  $pO_2$  decrease in the brain cortex tissue performed on the model of a tissue capillary cylinder were based on the  $pO_2$  value measured in the blood. The data give evidence that the critical  $pO_2$  level in brain tissues well agrees with the general picture of functional disturbances.

(Author)

#### A67-41852 #

EFFECT OF EXCLUSION OF AFFERENT SIGNALIZATION ON THE TONIC FUNCTION OF THE SKELETAL MUSCLE [O VLIYANII VYKLIUCHENIYA AFFERENTNOI SIGNALIZATSII NA TONICHE-SKUIU FUNKTSIIU SKELETNOI MYSHTSY].

M. N. Murav'ev.

*Kosmicheskaya Biologiya i Meditsina*, vol. 1, July-Aug. 1967, p. 61-65. 26 refs. In Russian.

Investigation of the functional mobility, excitability, work, and vigor of the tonic apparatus of the iliotibial muscle and of the reaction of this muscle to acetylcholine after deafferentation. The model used in the investigation was a tonic neuromuscular preparation from m. ileofibularis of a frog after deafferentation. A disturbed motor coordination and a substantially reduced performance of the tonic apparatus were observed. After 10 to 15 days after the operation, the iliotibial muscle responds by strong contraction to acetylcholine. However, the reactivity of the muscle was restored to the normal level after 30 to 35 days, and decreased to a level below normal after 55 to 60 days.

V. P.

#### A67-41853 #

HISTOCHEMICAL INVESTIGATION OF TISSUE ENZYMES DURING HYPOTHERMIA AND HYPOBIOSIS [GISTOKHIMICHESKOE ISSLEDOVANIE TKANEVYKH FERMENTOV PRI GIPOTERMII I GIPOBIOZE].

## A67-41854

V. V. Portugalov, I. B. Krasnov, E. I. Il'ina-Kakueva, N. N. Timofeev, and L. L. Marfina.  
Kosmicheskaya Biologiya i Meditsina, vol. 1, July-Aug. 1967, p. 66-70. 5 refs. In Russian.

Application of histochemical techniques to the study of the effect of a 2-hour hypothermia and a 24-hour hypobiosis on the activity of oxidizing enzymes of the carbohydrate, amino-acid, nucleotide, and aliphatic metabolisms of rats. The changes in the activity of the enzymes are described, and their functional significance is assessed. V. P.

## A67-41854 #

THE EFFECT OF HYPEROXIA ON THE FORMATION OF TOXIC LIPIDS IN RATS [VLIANIE GIPEROKSII NA OBRAZOVANIE TOKSICHESKIKH LIPIDOV U KRYSS].

F. V. Babchinskii and I. N. Savateev.

Kosmicheskaya Biologiya i Meditsina, vol. 1, July-Aug. 1967, p. 70-73. 10 refs. In Russian.

Experiments were carried out on white male rats exposed to different hyperoxic atmospheres for 20 days. An accumulation of toxic lipids in rat liver was determined by their hemolytic activity evaluated according to the method described previously. In the 94 to 96% oxygen atmosphere at the sea-level pressure the hemolytic activity of lipids showed a small increase by 24 hr to be followed by a high rise by 48 and 60 hr of the experiment. In the nitrogen-oxygen mixture (70% O<sub>2</sub> and 30% N<sub>2</sub>) and in the oxygen atmosphere at a total pressure of 567 mm Hg (in both cases the partial oxygen pressure was 488 mm Hg) the hemolytic activity of lipids increased by the 15th day only. In the 50% O<sub>2</sub>, 50% N<sub>2</sub> atmosphere the hemolysis of erythrocytes remained unaltered throughout the experiment. It is concluded that an evaluation of the hemolytic activity of lipids can be used as a nonspecific indication of the oxygen toxic effect. An accumulation of toxic lipids depends on the partial oxygen and exposure duration. Therefore, the partial oxygen pressure of 488 mm Hg can be regarded as a subtoxic value during a 20-day continuous exposure. (Author)

## A67-41855 #

CHANGING OF THE PSYCHOPHYSIOLOGICAL STATE OF THE ORGANISM BY AUTOGENOUS AND EXOGENOUS SUGGESTION [IZMENENIE PSIKHOFIZIOLOGICHESKOGO SOSTOYANIYA ORGANIZMA PUTEM AUTOGENNOGO I EKZOGENNOGO VNUSHENIYA]. G. I. Gurvich, V. L. Marishchuk, M. I. Tishchenko, G. D. Efimenko, and B. S. Khvoinov.

Kosmicheskaya Biologiya i Meditsina, vol. 1, July-Aug. 1967, p. 73-76. 10 refs. In Russian.

Application of autogenous and exogenous suggestion to the study of the activity of the organs and systems of the human organism after exposure to prolonged (70 days) bed rest. It was found that after three days of training, the test subjects were capable of finding a sound refreshing sleep even against a stress-factor background and to fall asleep at a prescribed time. V. P.

## A67-41856 #

MODELING OF PSYCHOPATHOLOGICAL SYNDROMES BY SPACE-PSYCHOLOGY METHODS [MODELIROVANIE PSIKHOPATOLOGICHESKIKH SINDROMOV METODAMI KOSMICHESKOI PSIKHOLOGII]. O. N. Kuznetsov and V. I. Lebedev.

Kosmicheskaya Biologiya i Meditsina, vol. 1, July-Aug. 1967, p. 77-81. 11 refs. In Russian.

Application of the differential-diagnostic capabilities of the clinicopsychopathological method to an analysis of the hallucination, depersonalization, and similar effects resulting from exposure to extremal factors, from the standpoint of space psychology. The effort to adapt to an unusual environment is seen to play a major part in the genesis of specific psychic changes. Results of neuro-psychiatric examinations are used to derive criteria for discriminating between normal and pathological states when analyzing psychic changes. V. P.

## A67-41857 #

PROCEDURE FOR PROCESSING SOME MOTOR CHARACTERISTICS IN BIOMECHANICAL INVESTIGATIONS ON AN ELECTRONIC DIGITAL COMPUTER [METODIKA OBRABOTKI NA ELEKTRONNOI TSIFROVOI VYCHISLITEL'NOI MASHINE (ETsVM) NEKOTORYKH KHARAKTERISTIK DVIZHENIYA V BIOMEKHANICHESKIKH ISSLEDOVANIYAKH].

B. A. Dushkov, V. P. Produnov, and S. A. Kosilov.

Kosmicheskaya Biologiya i Meditsina, vol. 1, July-Aug. 1967, p. 81-87. In Russian.

Development of an algorithm for processing primary characteristics of human motions on a digital computer. It is shown that the algorithm proposed combines large savings of time and a reduction of computational labor in procuring biomechanical information. V. P.

## A67-41858 #

COORDINATION STRUCTURE AND THE READJUSTMENT PHASES OF MOTOR HABITS UNDER CONDITIONS OF WEIGHTLESSNESS AND POSITIVE OVERLOADS [KOORDINATSIONNAYA STRUKTURA I FAZY PERESTROIKI DVIGATEL'NYKH NAVYKOV V USLOVIYAKH DEISTVIA NEVESOMOSTI I POLOZHITEL'NYKH PEREGRUZOK]. I. F. Chekirda.

Kosmicheskaya Biologiya i Meditsina, vol. 1, July-Aug. 1967, p. 87-92. 5 refs. In Russian.

Study of the qualitative features of motion coordination under conditions of intermittent acceleration and weightlessness during the flight of an aircraft along a weightlessness parabola. Twelve subjects were tested for the following motions: (1) moderate flexion and extension at the elbow performed within 2 sec with and without a 3-kg weight; (2) flexion and extension performed with a jerking motion without weights; and (3) freely performed moderate flexion and rapid aimed extension as well as rapid flexion and moderate aimed extension. A relationship is determined between the coordination structure of the movements and the force field. Three different phases of the readjustment of the movements to the weightless state are described. Cyclogramometric techniques using studied motions as tests for the selection and training of crew members for orbital flights are recommended. T. M.

## A67-41859 #

ELECTRIC STIMULATION EFFECT ON HUMAN VESTIBULAR RESPONSES TO ACCELERATIONS [VLIANIE ELEKTRICHESKOI STIMULATSII NA REAKTSII VESTIBULIARNOGO APPARATA CHELOVEKA, VZVYZVAEMYE USKORENIEM].

G. V. Voronin.

Kosmicheskaya Biologiya i Meditsina, vol. 1, July-Aug. 1967, p. 92-99. 12 refs. In Russian.

The purpose of the investigation was to establish possibilities of an electric control of the human vestibular responses to accelerations. Experiments with a combined (adequate and electric) effect on the vestibular apparatus of man were conducted. Vestibular reactions to accelerations can be increased or decreased by an exposure of the head surface to an electric current. Electric inhibition of vestibular reactions to accelerations can be performed in a two-fold manner - blocking (application of the positive polarity voltage to the vestibular apparatus irrespectively of the acceleration direction) and compensation (polarity of the voltage applied is related to the acceleration direction). A quantitative evaluation of the effect of the 7.5-ma current on the postnystagmus duration following rotation at 180-240°/sec upon a stop-stimulus gives average results: increase - 1.57%, compensation - 43%, blocking - 26%. The blocking effect of current decreases the intensity and duration of various vestibular responses to accelerations (somatic, sensory, and vegetative). (Author)

## A67-41995

BIOSELLITE ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM DESIGN.

Robert Ebersole, Louis Pochettino, and Walter Kugler (General Electric Co., Missile and Space Div., Valley Forge, Pa.).

Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 2-6, 1967, Paper 670839. 13 p.

Members, \$0.75; nonmembers, \$1.00.

The paper presents the environmental control and life-support system design for the 21- and 30-day mission NASA Biosatellite program. A two-loop system is described which provides temperature control for the fuel cell power source, cryogenic gases, water and urine storage, and the gas management system. The latter provides control of the gaseous environment in the recovery capsule. It controls temperature, relative humidity, recirculation and filtration of the atmosphere, buildup of toxic and/or nontoxic gases and odors, and partial and total pressure of the nitrogen/oxygen atmosphere. Comparison of experimental results with analytical predictions is presented. Extensive thermal vacuum system testing was performed to verify design predictions; good agreement with analysis was achieved. (Author)

#### A67-41996 \*

APPLICATION OF ADSORPTION BEDS TO SPACECRAFT LIFE SUPPORT SYSTEM.

J. K. Jackson and R. L. Blakely (McDonnell Douglas Corp., Douglas Aircraft Co., Missile and Space Systems Div., Santa Monica, Calif.).

Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 2-6, 1967, Paper 670842. 19 p. 7 refs.

Members, \$0.75; nonmembers, \$1.00.

Research sponsored by the Douglas Independent Research and Development Program; Contract No. NASw-1371.

Important parameters in designing regenerable absorption beds for spacecraft life support systems are defined. Typical applications include synthetic zeolite, which is used for carbon dioxide removal, and silica gel, which dehumidifies the atmospheric gas prior to passing it through the zeolite beds. Bed performance is evaluated from correlated test data. A linearized solution of the dynamic mass transfer equations is presented, which provides a simplified method of bed design. This method is used to find the optimum design for a typical four-bed regenerable, isothermal, carbon dioxide removal system. Results of this simplified analysis are compared with those of a detail digital computer study. This comparison indicates that the simplified method predicts system weight approximately 10% higher than the detailed evaluation. (Author)

#### A67-41997 \*

GAT-O-SORB - A REGENERABLE SORBENT FOR CARBON DIOXIDE CONTROL.

A. J. Glueckert, P. P. Nuccio, and J. D. Zeff (General American Transportation Corp., General American Research Div., Niles, Ill.).

Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 2-6, 1967, Paper 670844. 8 p.

Members, \$0.75; nonmembers, \$1.00.

Contract No. NAS 1-2915.

A regenerable absorbent in solid granular form has been developed for the removal of carbon dioxide from air or other gases. The unique features of the absorbent are: (1) no predrying of the gas stream is necessary prior to carbon dioxide absorption, and (2) only moderate regeneration conditions are necessary to desorb CO<sub>2</sub>, for example, heating to 180°F and evacuating to a 40-mm vacuum. An operating laboratory prototype having a four-man capacity was built and tested, continuously removing 0.41 lb/hr of carbon dioxide at a 7.6 mm CO<sub>2</sub> partial pressure. The system penalties for the unoptimized prototype are described. The absorbent, called GAT-O-SORB was devised and developed under an independent research program and improved for development of the laboratory prototype model. The design and performance of the cycling two-bed system are described. A comparison is shown between GAT-O-SORB and synthetic zeolite for carbon dioxide removal. (Author)

#### A67-42000

SELECTION OF AN OXYGEN REGENERATING SYSTEM TO MEET THE DEMANDS OF A MULTI-MISSION PROGRAM.

G. L. Drake and J. R. Burnett (General Dynamics Corp., Convair Div., San Diego, Calif.).

Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 2-6, 1967, Paper 670849. 12 p. 10 refs.

Members, \$0.75; nonmembers, \$1.00.

Study of problems involved in the selection of a critical life-support system function as a candidate for development and application in a multimission manned space program. The selection of an oxygen recovery system is considered, in order to illustrate the procedural aspects of the selection problem and the technical aspects of current approaches to oxygen recovery systems. The characteristics of an oxygen-supply-subsystem evaluation model are tabulated. M. F.

#### A67-42001

FECAL WASTE MANAGEMENT UNIT.

J. D. Zeff (General American Transportation Corp., General American Research Div., Niles, Ill.), B. J. Intorre (ARDE, Inc., Paramus, N.J.), A. B. Hearld, and C. A. Metzger (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

Society of Automotive Engineers, Aeronautics and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 2-6, 1967, Paper 670852. 7 p.

Members, \$0.75; nonmembers, \$1.00.

A novel waste management unit for the collection, sampling, drying, and storage of fecal wastes in a life-support simulator, or aerospace flights has been designed, developed, and tested. The unit collects the feces, which are subsequently air dried at ambient temperature and pressure, and stored. The unit is designed for use in a weightless environment yet has the convenience of operation of an ordinary terrestrial toilet. Other design features include measures to prevent fecal contamination or odors from entering the space cabin, low power requirements, and minimum loss of cabin air overboard. The unit weighs about 50 lb. (Author)

#### A67-42002 \*

ENGINEERING REQUIREMENTS FOR CULTURING OF HYDROGEN-OMONAS BACTERIA.

John F. Foster and John H. Litchfield (Battelle Memorial Institute, Columbus, Ohio).

Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 2-6, 1967, Paper 670854. 9 p. 6 refs.

Members, \$0.75; nonmembers, \$1.00.

Contracts No. NASr-100(03); No. NAS 2-4270.

Experimental results obtained with a continuous culture system for the cultivation of *Hydrogenomonas eutropha* for waste management in a life-support system indicate that a reliable and stable system can be designed under the present state-of-the-art. The present system provides for control of hydrogen, oxygen, carbon dioxide, pH, cell density, temperature, urea, and ammonia during growth. The culture system design is adaptable to operation in a zero-gravity field, and should be adaptable to integration with proposed water electrolysis and product recovery systems for waste management in an overall life support system. (Author)

#### A67-42047

SORPTION OF HELIUM BY 4.2°K CRYODEPOSITS.

Ronald Dawbarn and J. D. Haygood (ARO, Inc., Arnold Engineering Development Center, Aerospace Environmental Facility, Arnold Air Force Station, Tenn.).

IN: AMERICAN SOCIETY FOR TESTING AND MATERIALS, INSTITUTE OF ENVIRONMENTAL SCIENCES, AND AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, SPACE SIMULATION CONFERENCE, 2ND, PHILADELPHIA, PA., SEPTEMBER 11-13, 1967, TECHNICAL PAPERS. [A67-42028 24-11]

## A67-42049

Philadelphia, American Society for Testing and Materials, 1967, p. 187-191. 7 refs.

Cryodeposits of  $N_2$ ,  $O_2$ , and A were collected on a 4.2°K sphere and used to investigate their ability to pump He. All three cryodeposits pumped He, with  $N_2$  being the least effective. Preliminary tests indicated that  $O_2$  and A were comparable. Deleterious effects of the  $O_2$  on the mass spectrometer's stability discouraged further examination of this gas. Using precoated frosts of A, initial pumping speeds of 18.4 liters/sec/cm<sup>2</sup> were recorded, yielding a calculated capture coefficient of 0.53. Simultaneous deposition of A and pumping of He yielded apparent capture coefficients for He as high as 0.65. Capture coefficients for  $N_2$ ,  $O_2$  and A, shielded at 77°K and pumped by the 4.2°K sphere, were all found to be 1.

(Author)

## A67-42049 \*

MANNED TESTING OF EXTRAVEHICULAR ACTIVITY EQUIPMENT IN A SIMULATED SPACE ENVIRONMENT.

Orvis E. Pigg (NASA, Manned Spacecraft Center, Structures and Mechanics Div., Space Environment Simulation Laboratory, Houston, Tex.).

IN: AMERICAN SOCIETY FOR TESTING AND MATERIALS, INSTITUTE OF ENVIRONMENTAL SCIENCES, AND AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, SPACE SIMULATION CONFERENCE, 2ND, PHILADELPHIA, PA., SEPTEMBER 11-13, 1967, TECHNICAL PAPERS. [A67-42028 24-11] Philadelphia, American Society for Testing and Materials, 1967, p. 196-204.

Summary of four manned extravehicular-activity (EVA) equipment tests in support of the Gemini Program and the Apollo Spacecraft Program with particular emphasis on objectives, specialized test equipment, and crewman ingress and egress with the chambers at thermal-vacuum conditions. Chamber ingress and egress difficulties are reviewed and are related to the EVA equipment tested.

M. F.

## A67-42052 #

PRESENT STATE OF THE PROBLEM OF THE GENESIS OF LIFE AND THE PROSPECTS FOR ITS SOLUTION [SOVREMENNOE SOSTOYANIE I PERSPEKTIVY RESHENIA PROBLEMY VOZNIKNOVENIYA ZHIZNI].

A. I. Oparin (Akademiya Nauk SSSR, Institut Biokhimi, Moscow, USSR). Akademiya Nauk SSSR, Izvestiya, Seriya Biologicheskaya, vol. 32, Sept.-Oct. 1967, p. 656-668. 5 refs. In Russian.

Review of the history, philosophy, and current concepts of our knowledge of the origin of life on the earth, noting recent increased interest in this problem in the world scientific community. It is contended that life is a product of the evolution of carbon compounds with steadily growing complexity into polymolecular systems which further develop into protobionts - individual open systems capable of reproduction by reacting with ambient media. The two currently prevalent theories - that of the formation of individual molecules of nucleic acid in the primordial "broth" and that of a primordial metabolic mechanism are noted. The author's experiments with coacervate droplets of polyadenine and polylysine, carried out in order to imitate these processes in the laboratory, are described.

V. Z.

## A67-42053 #

PROBLEMS OF SPACE GENETICS [PROBLEMY KOSMICHESKOI GENETIKI].

N. P. Dubinin (Akademiya Nauk SSSR, Institut Obshchei Genetiki, Moscow, USSR).

Akademiya Nauk SSSR, Izvestiya, Seriya Biologicheskaya, vol. 32, Sept.-Oct. 1967, p. 669-681. 59 refs. In Russian.

Consideration of the current state and future goals of space genetics in the light of available space-flight data for experimental animals. The aspects of space genetics to be studied are outlined as (1) the causes and characteristics of mutations observed in some experimental animals exposed to a space environment, (2) selection

of new forms of organisms as members of the closed ecological systems of spacecraft, (3) quantitative evaluation of the hereditary damage sustained by various organisms in various space environments, and (4) studies of molecular, cytological, and genetic heredity in various organisms exposed to extraterrestrial environments.

V. Z.

## A67-42054 #

CERTAIN FEATURES OF THE PHYSIOLOGICAL REACTIONS OF PILOTS DURING A SIMULATED STAY OUTSIDE A SPACECRAFT [NEKOTORYE OSOBENNOSTI FIZIOLOGICHESKIKH REAKTSII PILOTOV PRI IMITATSII VYKHODA IZ KOSMICHESKOGO KORA-BLIA].

D. G. Maksimov, E. M. Peshkov, I. A. Skiba, and A. E. Uglov. Akademiya Nauk SSSR, Izvestiya, Seriya Biologicheskaya, vol. 32, Sept.-Oct. 1967, p. 682-694. 22 refs. In Russian.

Analysis of the physiological reactions of cosmonauts during a simulated exposure to a space environment outside a Voskhod 2 spacecraft in an altitude chamber at pressures down to 3.5 torr. Changes in heart and respiration rates, in the temperature and weight of the body, and, in some cases, in the EKG patterns are noted. These changes are smaller in trained space crewmen than in untrained individuals and become less pronounced when exposures are repeated.

V. Z.

## A67-42099 \*

POLYDIPSIA ELICITED BY THE SYNERGISTIC ACTION OF A SACCHARIN AND GLUCOSE SOLUTION.

Elliot S. Valenstein, Verne C. Cox, and Jan W. Kakolewski (Fels Research Institute, Dept. of Psychophysiology-Neurophysiology, Yellow Springs, Ohio).

Science, vol. 157, Aug. 4, 1967, p. 552-554. 8 refs.

NIH Grants No. M-4529; No. MH-4947; Grants No. NSG-437; No. NGR-36-005-001.

Rats consume significantly more of a solution combining saccharin and glucose than equivalent solutions of these substances in separate bottles. Fluid consumption may exceed body weight. Experiments helping to delineate the basis of this synergistic action are presented.

(Author)

## A67-42221 \*

DISSOCIATION OF THE VISUAL PLACING RESPONSE INTO ELICITED AND GUIDED COMPONENTS.

A. Hein and R. Held (Massachusetts Institute of Technology, Dept. of Psychology, Cambridge, Mass.).

Science, vol. 158, Oct. 20, 1967, p. 390-392. 21 refs.

NSF Grant No. GB-2728; PHS Grant No. M-7642; Grant No. NSG-496.

Description of a test for visually controlled placing of the forelimbs of kittens with no need for special apparatus or training of the animal. Kittens reared without sight of their limbs extended their forelimbs when carried down toward the edge of a horizontal surface. However, unlike normally reared kittens, they were not capable of guiding their paws accurately to the solid parts of an interrupted surface.

B. B.

## A67-42393 #

FURTHER INVESTIGATIONS OF THE COMPLEX EFFECT OF IONIZING RADIATION AND ACCELERATIONS ON AN ORGANISM IN ASSOCIATION WITH SPACE FLIGHTS [DAL'NEISHIE ISSLEDOVANIYA KOMPLEKSNOGO VOZDEISTVIA NA ORGANIZM IONIZIRUIUSHCHEGO IZLUCHENIYA I USKORENIY V SVYAZI S KOSMICHESKIMI POLETAMI].

V. V. Antipov, B. I. Davydov, E. F. Panchenko, and P. P. Saksonov (Akademiya Nauk SSSR, Moscow, USSR).

International Astronautical Federation, International Astronautical Congress, 18th, Belgrade, Yugoslavia, Sept. 24-30, 1967, Paper, 20 p. 30 refs. In Russian.

Discussion of the results of a series of tests conducted as a continuation of the authors' investigations concerning the reaction of a preirradiated organism to the effect of various flight factors. The primary aim is to assess the part played by restorative

processes in an irradiated organism in its reaction to critical accelerations. Results obtained with 1200 white mice exposed to gamma and X rays in doses up to 4000 rem are analyzed, showing that, in principle, it should be possible to extrapolate from animals to man and to obtain tentative estimates on the magnitude of admissible ionizing radiation doses, using endurance to acceleration as a criterion.

V. P.

**A67-42453 \*****COMPUTER SIMULATION OF BIOLOGICAL PATTERN GENERATION PROCESSES.**

Dan Cohen (Hebrew University, Dept. of Botany, Jerusalem, Israel).

*Nature*, vol. 216, Oct. 21, 1967, p. 246-248.

NSF-NIH-NASA-supported research.

Description of an attempt to simulate the growth of some biological patterns with the aid of a digital computer, using the simplest possible generation rules and the smallest number of parameters in the programs. A program, consisting of an organized set of generation rules, was written for each class of biological patterns to be simulated. Each set of rules was derived from plausible hypotheses of the natural mechanisms, the rules being modified and extended as the work progressed. For the sake of simplicity, only branching patterns in two dimensions were considered. This class of patterns is characteristic of vascularization in leaves and other flat or layered structures, and of branching on a flat surface. The simulation models were restricted to growth occurring at the free ends of branches, and to branching behind the growing tip.

P. v. T.

**A67-42455****ORIGIN OF ROUND-BODY STRUCTURES IN THE ORGUEIL METEORITE.**

S. L. VanLandingham (Northeast Louisiana State College, Dept. of Biology, Monroe, La.), C. N. Sun (St. Louis University, School of Medicine, Dept. of Pathology, St. Louis, Mo.), and W. C. Tan (Indiana University, School of Medicine, Dept. of Biochemistry, Indianapolis, Ind.).

*Nature*, vol. 216, Oct. 21, 1967, p. 252, 253. 5 refs.

Examination of the Orgueil meteorite in order to check on its lack of bacterial contamination and on the reports of biological materials and lifelike objects allegedly contained in this meteorite. Because there is ample evidence for biogenic substances existing in the Orgueil meteorite, evaluation of their origin seemed to be the next step to take. Among a vast area of mineral matrix, numerous objects or round structures could be observed. The fact that these structural bodies are located within the matrix of the meteorite mineral would render them relatively out of reach of factors which might produce artifacts or external contaminations. It is not suggested, however, that these organized structures are strictly biological bodies.

P. v. T.

**A67-42653 \*****MOLECULAR WEIGHT AND AMINO ACID COMPOSITION OF CHROMATIUM FERREDOXIN.**

Richard M. Sasaki and Hiroshi Matsubara (California, University, Space Science Laboratory, Berkeley, Calif.).

*Biochemical and Biophysical Research Communications*, vol. 28, no. 3, 1967, p. 467-473. 23 refs.

Grants No. NSG-479; No. NSG-05-003-020.

Experimental investigation aimed at clarifying certain discrepancies between existing descriptions of the molecular weight and some chemical properties of a ferredoxin isolated from the photosynthetic anaerobic bacteria, chromatium. The molecular weight and amino acid composition of chromatium ferredoxin are determined, and the amino-terminal amino acid residue is identified. It is found that both the molecular weight and the amino acid composition of chromatium ferredoxin lie between those of the clostridial and plant-type ferredoxins (according to Arnon's classification).

V. P.

**A67-42656 \*****RADIATION AND THE FIRST BIOPOLYMERS.**

Sidney W. Fox (Miami, University, School of Environmental and Planetary Sciences, Institute of Molecular Evolution, Coral Gables, Fla.).

IN: *RADIATION RESEARCH* 1966.

Edited by G. Silini.

Amsterdam, North-Holland Publishing Co., 1967, p. 714-729.

46 refs.

Grants No. NSG-689; No. NSG-10-007-008.

Review of current theory concerning the origin of the protocell as a unit of life, and evaluation of the effects of radiation on the polymers implicated in the process. Properties of proteinoids are described, together with the characteristics of the microparticles formed by heating proteinoids with water. The effects of radiation on the synthesis of polymers and on the stability of already synthesized polymers are considered.

T. M.

**A67-42698****RECENT WORK ON THEORETICAL MODELS OF BIOLOGICAL MEMORY.**

Frank Rosenblatt (Cornell University, Ithaca, N.Y.).

IN: *COMPUTER AND INFORMATION SCIENCES-II: PROCEEDINGS OF THE SECOND SYMPOSIUM, BATTELLE MEMORIAL INSTITUTE COLUMBUS, OHIO, AUGUST 22-24, 1966*. [A67-42696 24-10]

Symposium sponsored by the Ohio State University and the Office of Naval Research of the U.S. Navy.

Edited by J. T. Tou.

New York, Academic Press, Inc., 1967, p. 33-56. 17 refs.

NSF Contract No. GK-250; Contract No. Nonr-401(40).

Improvement of a model for long-term sequential memory in the nervous system by introduction of a simple and more biologically plausible C-system (a network which serves as a sequential clock for maintaining the temporal order of stored events). Simulation studies of the entire system were made. An improved biochemical model for the postulated synaptic changes was developed and is evaluated in relation to recent experimental evidence on the biochemical basis of memory. In addition to providing an explanatory model, the new theory suggests a number of biological experiments.

F. R. L.

**A67-42701 #****PROACTIVE INHIBITION, RECENCY, AND LIMITED-CHANNEL CAPACITY UNDER ACOUSTIC STRESS.**

Donald Eldredge and Allen C. Busch (USAF, Systems Command, Electronic Systems Div., Decision Sciences Laboratory, Bedford, Mass.).

*Perceptual and Motor Skills*, vol. 25, 1967, p. 85-91. 10 refs.

The study investigated the effects of an increase in the level of acoustic stress (SNR) on the retrieval of message sets of 2, 3, or 4 unrelated words presented successively. The results indicated that noise degradation did indeed affect the efficiency with which subjects retrieve sequences of successively presented items. It was noticed that the retention of the initial item of a message set caused a marked decrement in the retention and retrieval of subsequent items of the message set and that the effect increased as a function of the number of words presented. The effects were attributed to proactive inhibition, recency, and limited-channel capacity.

(Author)

**A67-42705 \*****CERTIFICATION OF PROBABILITY OF STERILIZATION OF LIQUID BY FILTRATION.**

Dorothy M. Portner, Charles R. Phillips, and Robert K. Hoffman (U.S. Army, Munitions Command, Biological Laboratories, Fort Detrick, Md.).

*Applied Microbiology*, vol. 15, July 1967, p. 800-807. 7 refs.

NASA Contracts No. R-45; No. R-21-005-001.

Four types of hydrosol filters - two reusable (diatomaceous cylinder and fritted-glass funnel) and two disposable (asbestos pad and membrane filter) - were challenged with a heavy bacterial suspension to assess their ability to produce sterile filtrates. Two of the four diatomaceous earth filters, the four fritted-glass funnels,

## A67-42941

and all of the asbestos pads tested generally gave sterile filtrates. However, only one type of filter, one of the membranes in its manufacturer's own holder, consistently gave sterile filtrates. The two other types of membranes usually gave sterile filtrates if tested in one manufacturer's holder, but all types invariably gave contaminated filtrates when tested in another manufacturer's holder. Contaminated filtrates were generally attributed to a poor reusable filter or to a faulty holder used with a disposable filter. If a high degree of certainty is required for a sterile heat-labile filtrate, it is suggested that the liquid be passed through two or more filters in a previously tested and proven system. (Author)

### A67-42941 #

#### A TECHNIQUE OF SIMULATION OF THE OPERATIONAL AND HUMAN FACTORS DESIGN OF THE APOLLO AIRLOCK MODULE AND THE GEMINI IX-XII EVA MISSIONS.

William J. Bruchey, Jr., Harry L. Loats, Jr., and G. Samuel Mattingly (Environmental Research Associates, Randallstown, Md.). American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 4th, Anaheim, Calif., Oct. 23-27, 1967, Paper 67-773. 7 p.

Members, \$1.00; nonmembers, \$1.50.

Description of a water-immersion simulation that was used to investigate the performance characteristics of astronauts for the Gemini 9 to 12 EVA missions and proposed Apollo-Airlock-Module (ALM) intra- and extravehicular tasks. The program began as an evaluation of the water-immersion technique by Astronaut Cernan subjectively correlating the simulation with his actual in-space experience. As the program progressed, its emphasis was modified to preassess potential EVA problem areas of the current Gemini EVA tasks. Consequently, Astronaut Aldrin used this capability to preassess and practice his extravehicular tasks for GT-12. Concurrent with the GT-12 evaluation, the simulation technique was used to investigate five major categories of ALM tasks: airlock activation, SIV-8 dome removal, replenishment, rescue, and suit donning. M.M.

### A67-42944 #

#### THE INFLUENCE OF STERILIZATION ON THE RELIABILITY OF INTERPLANETARY SPACECRAFT SYSTEMS.

A. M. Nowitzky (Exodyne Co., Chatsworth, Calif.). American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 4th, Anaheim, Calif., Oct. 23-27, 1967, Paper 67-776. 7 p.

Members, \$1.00; nonmembers, \$1.50.

Examination of the influence of sterilization on the functional reliability of a spacecraft system, as well as the reliability of mission success, in the light of the spacecraft sterilization requirement. The mechanism of heat sterilization which accompanies the manufacturing heat-cure cycles of electronic piece parts is shown to introduce the concept of the selection of electronic piece parts and other sealed components, which are rendered sterile during manufacture. The envisioned technique would further consider the selection of parts which are amenable to modification of their manufacturing process to achieve sterile end products. The postponement of final heat cures until after subsystem assembly, thus permitting the heat-cure cycle to be the mechanism of subsystem internal sterilization is considered. Extension of the projected method to include the entire vehicle system is advanced. It is suggested that sterility certification may be simplified by the proposed method. M.M.

### A67-42972 \*#

#### CONTINGENCY PLANNING FOR SPACE-FLIGHT EMERGENCIES.

Stephen H. Dole (RAND Corp., Santa Monica, Calif.). American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 4th, Anaheim, Calif., Oct. 23-27, 1967, Paper 67-825. 5 p.

Members, \$1.00; nonmembers, \$1.50.

Contract No. NASr-21.

An analytical study of emergencies that might occur in space during future manned missions is summarized. Various conceptual

remedial systems are compared as to relative effectiveness and costs. From an analysis of the potential causes and consequences of emergencies in space, it is evident that there are only a small number of different ways in which the lives of crewmembers might be threatened: (1) metabolic deprivations, (2) excessive physiological stresses, and (3) injuries and poisonings. From knowledge of the physiological effects and the amounts of time available for remedial action associated with each of these threats to life, relationships can be generated for comparing the effectiveness of remedial systems. In all the mission areas considered, remedial systems of two types - "buddy" and "onboard" - appeared to be the most promising on the basis of high effectiveness and reasonable cost. "Buddy" denotes the concept in which a single spacecraft is replaced by two smaller spacecraft, each capable of independent operation, each containing part of the crew, and each able to help the other in an emergency. "Onboard" means the emergency equipment is installed within the basic spacecraft at the beginning of the mission. (Author)

### A67-42982 #

#### INTEGRATION OF PHYSIOLOGICAL RESEARCH IN SPACE.

B. D. Newsom (General Dynamics Corp., Convair Div., San Diego, Calif.).

American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 4th, Anaheim, Calif., Oct. 23-27, 1967, Paper 67-846. 10 p.

Members, \$1.00; nonmembers, \$1.50.

Demonstration of the feasibility of the basic concept of integrating various pieces of required equipment for the Apollo Application Program (AAP) physiological experiments. All dimensions used in the chair design appear adequate and can be used for the design of a flight article. The air-bearing systems used for mass determination allow reasonable one-g use of the restraint for training purposes. There was no opportunity to test this design at zero g, and such testing should be done. The water-immersion study indicated that parabolic flights should be used. M.M.

### A67-42984 #

#### THE HUMAN ERROR RESEARCH AND ANALYSIS PROGRAM (HERAP).

J. A. Mastropaolo, A. A. Burrows (McDonnell Douglas Corp., Douglas Aircraft Co., Aircraft Div., Long Beach, Calif.), R. E. Luehrs, and R. A. Alkov (U.S. Naval Aviation Safety Center, Behavioral Sciences Div., Aero-Medical Dept., Norfolk, Va.). American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 4th, Anaheim, Calif., Oct. 23-27, 1967, Paper 67-848. 5 p.

Members, \$1.00; nonmembers, \$1.50.

The purpose of the Human Error Research and Analysis Program (HERAP) is to analyze the man-machine-environment system, to synthesize improvements in human performance and, thereby, to attenuate the frequency and severity of accidents. A typical mission was analyzed to map where demands on the pilot, risk, and accidents are greatest. Existing computer files have been organized into a data bank to apply efficiently analytical statistical tools and to evaluate the validity and reliability of the basic data. Methods are under study to optimize the collection of exposure data. Accident rates adjusted for risk shall permit an unbiased baseline from which to judge future performance and attempts to decrease accidents. Emphasis has been placed on supporting the accident investigator with rapid-access computer files of airframe changes and accident patterns. Work is in progress on how the accident investigator can code his findings to optimize the assistance obtained from such files. Certain data suggest that proper collection of exposure data can, in itself, improve pilot performance which, in turn, is likely to reduce accidents. The total analytical system has been designed to do in days what present methods do in months or years. (Author)

### A67-42989 #

#### LUNAR SURFACE SIMULATION.

Joseph L. Seminara (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Biotechnology Organization, Human Factors Group, Sunnyvale, Calif.).

American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 4th, Anaheim, Calif., Oct. 23-27, 1967, Paper 67-866, 8 p.

Members, \$1.00; nonmembers, \$1.50.

Lockheed Missiles and Space Company (LMSC) has developed a lunar-environment-simulation test bed for the purpose of assessing astronaut capabilities and limitations in relation to advanced lunar-vehicle hardware concepts. A simulated lunar shelter and a representation of the lunar extravehicular environment have been assembled within a large man-rated altitude chamber. The test bed permits a determination of the interactive effects of reduced gravity, suit encumbrances and the reduced pressure associated with altitude. The results of a five-day lunar-shelter and extravehicular test involving a four-man "lunar crew" are presented. Performance testing within the shelter involved a determination of crew responsiveness to auditory alarms when these alarms aroused test subjects during sleep periods. A performance decrement of between 5 and 360% was observed in comparing normal-awake and sleep-arousal performance times for a variety of space-typical tasks. The EVA effects of 1/6 g, suit encumbrance, and reduced pressure, when combined, significantly degraded simulated lunar astronaut performance of routine maintenance tasks and control manipulations. It is evident from this research that it is just as important to qualify man under realistic simulated environments as it is to space qualify black boxes.

(Author)

#### A67-42999 \*#

##### SPACE CREW ENVIRONMENT.

Emanuel M. Roth (Lovelace Foundation for Medical Education and Research, Dept. of Aerospace Medicine and Bioastronautics, Albuquerque, N. Mex.).

American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 4th, Anaheim, Calif., Oct. 23-27, 1967, Paper 67-855, 16 p. 76 refs.

Members, \$1.00; nonmembers, \$1.50.

Contract No. NASr-115.

Study of the relation between the space-cabin atmosphere and other environmental and operational variables, in an attempt to focus on some of the more subtle interfaces which may affect crew and mission safety. Emphasis is placed on more recent findings and persistent problem areas. The most probable atmospheric failures causing deterioration of physiological functions are the decrease in oxygen partial pressure leading to hypoxia, the increase in carbon dioxide partial pressure leading to the syndrome of hypercapnia or carbonic acid poisoning, and the buildup of trace contaminants in the atmosphere which can lead to any one of many modes of human failure. Unfortunately, failure of the environmental control system in a spacecraft can lead to a combination of these physiological problems.

P.v.T.

#### A67-43020 \*#

##### CONTRIBUTIONS OF A DEVELOPMENTAL INTEGRATED LIFE SUPPORT SYSTEM TO AEROSPACE TECHNOLOGY.

J. N. Pecoraro (NASA, Office of Advanced Research and Technology, Washington, D.C.), A. O. Pearson (NASA, Langley Research Center, Hampton, Va.), G. L. Drake, and J. R. Burnett (General Dynamics Corp., Convair Div., San Diego, Calif.).

American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 4th, Anaheim, Calif., Oct. 23-27, 1967, Paper 67-924, 17 p.

Members, \$1.00; nonmembers, \$1.50.

Discussion of the Integrated Life Support System program (ILSS) at NASA Langley Research Center (LRC), highlighting its contribution to aerospace technology. Four major areas of interest are outlined: (1) general orientation to research and development in life-support systems; (2) a description of the ILSS currently underway at NASA LRC; (3) experience with the ILSS in the research and development program; and (4) a summary of its contributions combined with those of interrelated programs.

P.v.T.

#### A67-43023 #

##### MAN IN ORBIT - A COMMERCIAL ASSET?

Starr J. Colby (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.).

American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 4th, Anaheim, Calif., Oct. 23-27, 1967, Paper 67-927, 23 p. 7 refs.

Members, \$1.00; nonmembers, \$1.50.

Examination of the history and probable future of the man-in-space program. Programs either completed or already underway (Gemini, the Manned Orbiting Laboratory, SST, etc.) and programs which are still in the future (a 30-man R&D laboratory in orbit, a man-maintained astrophysical observatory, etc.) are examined in terms of costs and benefits. It is concluded that even the most sophisticated hardware will not obviate the need for man to go into space.

D.H.

#### A67-43045 #

##### PERSONNEL THERMO-PROTECTIVE SYSTEMS. II.

Kenneth N. Tinklepaugh (U.S. Navy, Naval Missile Center, Point Mugu, Calif.).

American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 4th, Anaheim, Calif., Oct. 23-27, 1967, Paper 67-967, 5 p. 8 refs.

Members, \$1.00; nonmembers, \$1.50.

Investigations into possible solutions to aircraft-personnel cooling and heating problems, indicating approaches where detailed solutions are not yet available. Results of a Naval Missile Center project to develop a cream product giving off heat when dissolved in fresh sea water are discussed. The product developed consists of calcium chloride buffered by inert materials. Special gloves and a wrist-band heater to utilize the cream are described.

P.v.T.

#### A67-43046 #

##### OPEN SEA TESTING OF AVIATORS' COVERALLS.

Frank J. Formeller and Carol S. Cureton (U.S. Navy, Naval Missile Center, Point Mugu, Calif.).

American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 4th, Anaheim, Calif., Oct. 23-27, 1967, Paper 67-968, 5 p. 6 refs.

Members, \$1.00; nonmembers, \$1.50.

A physiological study was made to determine the degree of protection afforded by various types of military flight clothing in actual survival conditions. Each subject compared his ability to withstand moderate environmental conditions wearing the MK-5A antixposure suit and a modified wet suit. Environmental conditions included water temperatures from 56 to 70°F, air temperatures from 54 to 71°F, and wind velocities from 2 to 16 knots. Each subject, wearing full flight gear, was immersed in the open sea to duplicate actual survival conditions. He then entered the life raft where he remained until the body core temperature declined to 96°F, the skin temperature to 45°F, or a maximum of 4-hr elapsed. The results indicated that subjects wearing loose fitting wet suits experienced a core temperature drop of 0.78°F/hr. When wearing the MK-5A the same subjects had a core temperature drop of 0.70°F/hr. It was also found that, when kept completely free from water leakage, the MK-5A prevented the rapid drop in skin temperature that is necessary for vasoconstriction and subsequent heat conservation.

(Author)



## LC ENTRIES

### A67-82013

#### MODEL FOR EVALUATION OF FATTY ACID METABOLISM FOR MAN DURING PROLONGED EXERCISE.

D. R. Young, J. Shapira, R. Forrest, R. R. Adachi, R. Lim, and R. Pelligra (NASA, Ames Res. Center, Biotechnol. Div., Moffett Field, Calif.)

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 716-725. 30 refs.

Plasma free fatty acid (FFA) was examined in two subjects during prolonged physical exercises. Uniformly labeled palmitate- $^{14}\text{C}$  was administered as a single injection after 9 hr. of treadmill walking, and observations were made during an additional 4.5-hr. period of exercise. Seventy percent of the administered dose appeared as  $^{14}\text{CO}_2$ . Plasma FFA efflux varied between 2.13 and 2.28 mmol/min. Between 49 and 52% of total  $\text{CO}_2$  production was derived from the oxidation of FFA. The efflux of triglycerides which were recycled into the plasma varied from 0.0090 to 0.0102 mmol/min. In resting controls, 25% of the administered dose was secreted as  $^{14}\text{CO}_2$ . Plasma FFA efflux varied between 0.787 and 0.849 mmol/min. Approximately 38% of total  $\text{CO}_2$  production was derived from the oxidation of FFA. Efflux of plasma triglycerides varied between 0.0185 and 0.224 mmol/min. A preliminary multicompartmental model of plasma FFA metabolism is presented. The model places in juxtaposition various metabolic pools and defines certain flow rates which are consistent with (a) the observations of others and (b) underlying theories regarding fat metabolism.

### A67-82014

#### CEREBRAL CORTICAL BLOOD FLOW DURING CHANGES OF ACID-BASE EQUILIBRIUM OF THE BRAIN.

Eberhard Betz and Dieter Heuser (Marburg U., Inst. of Physiol., West Germany).

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 726-733. 27 refs.

Deut. Forschungsgemeinschaft supported research.

In anesthetized cats, cortical blood flow, cortical pH, cortical carbon dioxide tension ( $\text{PCO}_2$ ), cortical oxygen tension ( $\text{PO}_2$ ) on the suprasylvian gyrus, arterial blood pressure, arterial pH, and end-expiratory  $\text{CO}_2$  content were recorded simultaneously. In respiratory acidosis (caused by  $\text{CO}_2$  inhalation), metabolic acidosis of the blood (intravenous injection of HCl), metabolic alkalosis of the blood (intravenous injection of  $\text{NaHCO}_3$ ), respiratory alkalosis (hyperventilation), and in posthypoxic reactive hyperemia (inhalation of nitrogen, 2-4 min.) the reactions were followed for 15 min. It was demonstrated, that during this time the cortical extracellular pH was correlated with the cortical vascular resistance, whereas  $\text{PCO}_2$ ,  $\text{PO}_2$ , end-expiratory  $\text{CO}_2$  content, arterial pH, and arterial blood pressure were not always correlated with cortical vascular resistance. The significance of the extracellular cortical pH is discussed. Interactions of other mechanisms for the regulation of cortical vascular resistance were demonstrated by experiments with injections of Papaverin and artificially produced cerebral edema. It is concluded that the cortical extracellular pH has a key position for the regulation of cortical vascular resistance and for the blood flow of the vessels on the cortical surface.

### A67-82015

#### GLUCOSE OXIDATION AND REPLACEMENT DURING PROLONGED EXERCISE IN MAN.

D. R. Young, R. Pelligra, J. Shapira, R. R. Adachi, and K. Skrettingland (NASA, Ames Res. Center, Biotechnol. Div., Moffett Field, Calif.)

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 734-741. 39 refs.

Blood glucose turnover rate and oxidation were examined during prolonged physical exercise. Uniformly labeled glucose- $^{14}\text{C}$  was administered as a single injection after 9 hr. of treadmill walking, and observations were made during an additional 4.5-hr. period of exercise. Glucose turnover rate was 206 mg./kg./hr., glucose oxidation rate was 175 mg./kg./hr., and 17% of total  $\text{CO}_2$  production was derived from the oxidation of glucose. In resting subjects, glucose turnover rate was 140 mg./kg./hr., glucose oxidation was 79 mg./kg./hr., and 33% of total  $\text{CO}_2$  production was derived from glucose metabolism. The incorporation of various precursors into the blood glucose was examined. The incorporation of carbon from palmitate, alanine, and glycerol into glucose was similar during rest or exercise. The data suggest that relatively more lactate was recycled into glucose during exercise than at rest.

### A67-82016

#### EFFECT OF ECCENTRIC TRAINING OF AGONISTS ON ANTAGONISTIC MUSCLES.

Mohan Singh and Peter V. Karpovich (Springfield Coll. Physiol. Res. Lab., Mass.)

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 742-745. 13 refs.

Grant NIAMD AM 06724.

The forearm extensors of ten subjects were exercised four times a week for eight wk., performing 20 maximal eccentric contractions. The antagonists (flexors) of the same arm were tested before and after training for maximal strength (in terms of foot pounds of torque) during concentric, eccentric, and isometric contractions. It was found that the mean increases in strength of agonists were: concentrically 42.8%, eccentrically 22.9%, and isometrically 40.3%. The corresponding increases in mean strengths of antagonists were: 30.9, 16.7, and 26.4%. This considerable improvement in antagonistic muscles may be explained by the fact that during maximal contractions of agonists the antagonistic muscles also contracted. This was verified by palpation and electromyograms.

### A67-82017

#### SWEAT ELECTROLYTES IN DESERT WALKS.

D. B. Dill, S. M. Horvath, W. Van Beaumont, Gale Gehlsen, and Kay Burrus (Nev. Southern U., Desert Res. Inst., Lab. of Environ. Patho-Physiol., Boulder City).

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 746-751. 8 refs.

Grants NSF GB-5217 and PHS CD 00056-03.

The rate of sweating in desert walks at 80 or 100 m./min. and the concentrations of sodium, potassium, and chloride in sweat were studied in 31 school boys, the same number of school girls, in several men, and in two women. Findings indicate that the rate of sweating under such conditions even up to an ambient temperature of  $42^\circ\text{C}$ . depends on body surface, metabolic rate, and ambient temperature, not on sex nor age. The sweat produced is all evaporated; there is equal water economy irrespective of age and sex. Earlier unpublished findings on concentrations of electrolytes in sweat from the hand and from the body of men and boys are reported. Deductions based on sweat collected from a gloved hand may be invalid. In particular, the concentration of potassium may be three times higher than in sweat from the entire body surface. An individual exhibits a wide range in composition of sweat depending on the internal and external environment. Also there is a wide intraindividual range in the same external environment and at the same metabolic rate.

# **A67-82018 THEORY AND DESIGN OF AN "ON-LINE" CARDIAC OUTPUT COMPUTER.**

Albert L. Kunz and Charles W. Smith (Ohio State U., Dept. of Physiol., Columbus).

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 784-788. 10 refs.

PHS and Central Ohio Heart Assn. supported research.

Theory and design of a solid-state circuit for computing cardiac output "on-line" from standard dye-dilution techniques is presented. Circuit diagram and suggested values of components are included. This computer will (1) give immediate values for cardiac output in liters per min., (2) signal onset of recirculation, and (3) check validity of exponential downslope. Double-blind study of 57 determinations on six dogs comparing planimeter and computer results shows a correlation coefficient of 0.997.

# **A67-82019 ESTIMATION OF BODY VOLUME BY UNDERWATER WEIGHING: DESCRIPTION OF A SIMPLE METHOD.**

Frank Katch, Ernest D. Michael, and Steven M. Horvath (Calif. U., Inst. of Environ. Stress, Santa Barbara).

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 811-813. 8 refs.

Grants PHS 1 TO 1, HD 00235-01 and FR 152, 1966.

A description is given of a simple inexpensive device to determine body volume by the underwater weighing method. A standard swimming pool with a shallow end was used, and a wooden shell was placed in the pool to prevent water movement affecting the weighing. The method described makes it possible to study large numbers of subjects without the need for a special water tank. The prone position was used since it was found that less movement occurred when breathing in this position. Nine to ten trials of underwater weight were determined for 86 female subjects. The average of the last three trials was used as "true" underwater weight. Intraindividual variability associated with the last three trials of weighing was .0004-.0007 kg., and adjacent trial correlations of weighing were between .92 and .99. Mean body density calculated for 86 female subjects was 1.051, with an SD of 0.014.

# **A67-82020 EFFECTS OF FAT INTAKE AND EXERCISE ON SERUM CHOLESTEROL AND BODY COMPOSITION OF RATS.**

Dale L. Hanson, James A. Lorenzen, Alfred E. Morris, Richard A. Ahrens, and James E. Wilson, Jr. (Md. U., Coll. of Phys. Educ., College Park and U.S. Dept. of Agr., Agr. Res. Serv., Human Nutr. Res. Div., Beltsville, Md.).

*American Journal of Physiology*, vol. 213, Aug. 1967, p. 347-351. 10 refs.

One hundred and twenty male Wistar rats were obtained at 100 days of age and fed for 50 days a low-fat diet ad lib. to establish high body weight. The rats were then assigned to eight experimental groups of 15 rats each as follows: four groups received a high-fat diet and four groups continued to receive the low-fat diet, two groups on each diet being fed ad lib. and two groups were fed 65% of ad lib. intake; one of the two groups receiving each diet at a set calorie intake was forced to swim two 30-min. periods/day and the other group remained sedentary. Relative body composition was altered only by exercise at the ad lib. level of calorie intake. Feeding the high-fat diet at the restricted calorie intake significantly reduced liver weight, but this was due to a change in weight of the gastrointestinal contents. Exercise resulted in smaller perirenal and epididymal fat pads, but larger livers, hearts, and adrenals than those found in sedentary animals. Substituting the high-fat for the low-fat diet caused a relative

increase in adrenal size and the size of the perirenal and epididymal fat pads. Serum cholesterol tended to be higher in rats fed the high-fat diet and was significantly elevated in calorie-restricted animals forced to exercise.

# **A67-82021 EFFECT OF ETHANOL ON HEPATIC METABOLISM OF SULFOBROMOPHTHALEIN.**

Amos H. Lieberman and Alfred W. Childs (Calif. U., School of Med., Dept. of Med., Gastrointestinal Res. Lab., San Francisco and Calif. U., School of Public Health, Berkeley).

*Applied Journal of Physiology*, vol. 213, Aug. 1967, p. 353-357. 22 refs.

Grant PHS A-6115.

Hepatic uptake, storage, conjugation, and excretion of sulFOBromophthalein (BSP) (2 mg./100 g. body wt., administered iv) were measured in rats. Conjugated BSP in bile or extract of liver was identified by a method using paper chromatography. Ethanol, administered intraperitoneally in a dose of 120 mg. 120 mg./100 g. body wt., caused a decrease in the proportion of conjugated BSP in storage and in the rate of excretion of conjugated BSP in bile, but did not affect the rate of uptake, excretion of unconjugated BSP, or the ability of the liver to excrete administered BSP-glutathione mercaptide. It is concluded that ethanol decreases the rate of excretion of BSP by impairing conjugation with glutathione. Hepatic cellular mechanisms for uptake of dye from plasma and transfer of dye from cell to bile are independent of the mechanism for conjugation and conjugation is a rate-determining step in excretion of BSP.

# **A67-82022 RELATIONSHIP BETWEEN VITAMIN D DEFICIENCY, THYROCALCITONIN, AND PARATHYROID HORMONE.**

Hirotsoshi Morii and Hector F. DeLuca (Wis. U., Dept. of Biochem., Madison).

*American Journal of Physiology*, vol. 213, Aug. 1967, p. 358-362. 22 refs.

NASA Grant NSG-275 Suppl. No. 3, Contract AEC AT(11-1)-1668, and Grant PHS AMO-5800-05 NTN.

The effects of thyrocalcitonin and parathyroid hormone on serum Ca and P concentrations were studied in vitamin D-deficient animals. Thyrocalcitonin was effective in lowering serum Ca, while parathyroid hormone was without effect on this parameter in vitamin D deficiency. The low serum Ca which resulted from thyrocalcitonin remained low for a long period of time in thyroparathyroidectomized rats, while in intact animals the effect of thyrocalcitonin was very much shorter. The response of serum Ca to thyrocalcitonin was reduced by concomitant administration of parathyroid hormone. Serum P was also decreased by thyrocalcitonin in vitamin D-deficient animals. The hyperphosphatemia caused by thyroparathyroidectomy was reversed by administration of thyrocalcitonin both in vitamin D-deficient and vitamin D-fed animals.

# **A67-82023 VIBROTACTILE LEARNING.**

D. D. Diespecker (Newcastle U., New South Wales, Australia).

*Psychonomic Science*, vol. 9, Sep. 15, 1967, p. 107-108. 5 refs.

A vibrotactile learning experiment was conducted for two small groups: one of sighted, and one of blind subjects. Vibrators of the Sherrick type, were placed at five body loci. These loci are thought not to have been previously described in this type of experiment. A modification of the Howell system was used for encoding signals. There were no significant differences between the amounts of information transmitted in the two groups.

**A67-82024****EFFECT OF LIVING ESCHERICHIA COLI CELLS ON HEMODYNAMICS AND MORTALITY IN THE DOG.**

Thomas E. Emerson, Jr. and Florence C. Kelly (Okla. U., Med. School, Depts. of Physiol., Surg., and Microbiol., Oklahoma City and Mich. State U., Dept. of Physiol., East Lansing).

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 609-612. 10 refs.

Experiments were carried out to describe pathologic effects of injecting live *E. coli* cells in dogs. Intravenous injection of saline suspensions of live *E. coli* cells was followed by a gradual fall of systemic arterial blood pressure, an initial bradycardia followed by tachycardia, a fall of blood pH, an elevation of hematocrit, and the appearance of hemorrhagic lesions of the small bowel. A majority of dogs observed for 31 hr. after *E. coli* injection died. Findings in these dogs were compared to observations made in animals given purified *E. coli* endotoxin and control dogs injected with normal saline. Changes in arterial pressure, heart rate, pH, hematocrit, and small bowel lesions were similar in dogs given live *E. coli* cells or a bolus injection of *E. coli* endotoxin, with the exception of the immediate rise of portal vein pressure and precipitous fall of arterial pressure seen in the latter group. These data support the concept that the endotoxin molecule is a major factor in the pathogenesis of gram-negative bacteremic shock.

**A67-82025****PULMONARY CIRCULATION IN THE AGED.**

Cemil Emirgil, Bruce J. Sobol, Santiago Campodonico, Walter H. Herbert, and Reza Mechkati (Grasslands Hosp., Cardiopulmonary Lab., Valhalla, N. Y.).

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 631-640. 33 refs.

Westchester Heart Assn. supported research.

Physiologic changes in the pulmonary circulation with age were investigated in eight elderly subjects with essentially normal cardiopulmonary systems. All subjects were 60 years of age or older (average age, 66). The pressure-flow and resistance-flow relationship of the pulmonary circulation were studied at high flow rates by utilizing exercise and unilateral pulmonary artery occlusion. The results were compared with a young control group (average age, 39) and with existing data in the literature. The data are suggestive of a linear relationship between the pulmonary arterial pressure and flow in both groups over the observed flow range. The total pulmonary and pulmonary vascular resistances fell in all young control subjects as flow was increased. The older subjects did not show a uniform pattern. However, their average pulmonary vascular resistance was higher than the younger group. This difference is statistically significant at  $P = <0.05$ . At rest there was no significant difference between the two groups.

**A67-82026****FIBEROPTIC MONITORING OF CARDIAC OUTPUT AND HEPATIC DYE CLEARANCE IN DOGS.**

Brian McCarthy, William B. Hodd, Jr., and Bernard Lown (Harvard School of Public Health, Dept. of Nutr. and Peter Bent Brigham Hosp., Med. Clin., Boston, Mass.).

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 641-645. 13 refs.

Grant NIH PO 1 HE 11 306-01 and John A. Hartford Found. supported research.

Fiberoptic techniques were used to measure cardiac output, blood volume, and hepatic clearance of indocyanine green dye in anesthetized and unanesthetized dogs. These studies illustrate the utility of fiberoptic methods in terms of ease of making measurements and lack of necessity for blood sampling or withdrawal. Indocyanine dye concentration may be determined

accurately, continuously, and almost instantaneously. However, these studies also point out certain unsolved problems in the use of fiberoptics in long-term monitoring, and these include clotting at the catheter tip and base line and gain drift in the instrumentation.

**A67-82027****DETERMINANTS OF MAXIMAL EXPIRATORY FLOW FROM THE LUNGS.**

N. B. Pride, S. Permutt, R. L. Riley, and B. Bromberger-Barnea (Johns Hopkins U., School of Hyg. and Public Health, Dept. of Environ. Med., Baltimore, Md.)

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 646-662. 30 refs.

Grants PHS HE 10342, PHS TG-Hts 5453, PHS 5-K3-HE2711, and BSSAP00208.

Expiratory isovolume pressure-flow curves were obtained by a new method in 13 normal subjects, 8 men with irreversible airway obstruction, and 14 subjects with reversible airway obstruction. The difference between alveolar and mouth pressures when flow first reached maximum ( $\Delta P'$ ), the maximum flow ( $\dot{V}_{E_{max}}$ ), and airway resistance ( $R_A$ ) in the range of driving pressures below  $\Delta P'$  were studied at different lung volumes. Relationships between  $\dot{V}_{E_{max}}$ ,  $\Delta P'$ ,  $R_A$ , and lung volume showed three different patterns for the three groups of subjects studied. It is suggested that when  $\dot{V}_{E_{max}}$  is reached in an isovolume pressure-flow curve a "waterfall" or Starling resistor effect develops in the airways. Using the waterfall model, simple equations relating the roles of elastic recoil of the lung, airway resistance, and bronchial collapsibility in determining  $\dot{V}_{E_{max}}$ ,  $\Delta P'$ , and  $R_A$  were developed. Analysis using this model suggests that in the present study irreversible airway obstruction was characterized by increased resistance of the airway from the alveolus to the point where a waterfall develops, while in reversible airway obstruction the major abnormality was a decrease in driving pressure from alveolus to the waterfall due to increased back pressure from bronchomotor tone.

**A67-82028****EFFECT OF HYPOXIA ON DISTRIBUTION OF PULMONARY BLOOD FLOW.**

A. Dugard and A. Naimark (Manitoba U., Dept. of Physiol. and Winnipeg Gen. Hosp., Cardio-Respirat. Unit, Canada).

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 663-671. 32 refs.

MRC, Canada supported research.

The effect of alveolar hypoxia on the distribution of pulmonary blood flow was studied in nine anesthetized, spontaneously breathing mongrel dogs, using a modified  $^{133}\text{Xe}$  technique. Observations were made over a wide range of  $\text{H}^+$  concentration induced by adding  $\text{CO}_2$  to the inspired gas. In the upright (head up) position perfusion increased linearly with distance down the lung except near the bottom where a zone of decreased perfusion was frequently noted. The slope of the line relating relative perfusion to distance down the lung decreased during hypoxia indicating more uniform perfusion. No effect on the distribution of ventilation was noted. The magnitude of the change in relative perfusion gradient was affected by both the degree of hypoxia and the coincident  $\text{H}^+$  concentration but correlated best with the change in pulmonary artery pressure. In a few instances, however, when acidosis was especially severe, the perfusion gradient was reversed indicating a disproportionate increase in vascular resistance in lower lung zones.

**A67-82029****BLOOD GAS EXCHANGE IN EMPHYSEMA: AN EXAMPLE ILLUSTRATING METHOD OF CALCULATION.**

## A67-82030

T. K. C. King and W. A. Briscoe (Bellevue Hosp., Columbia Med. Div., Cardiopulmonary Lab. and Columbia U., Coll. of Physicians and Surgeons, Dept. of Med., New York City, N. Y.)  
*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 672-682. 17 refs.

Grants NHI HE-02001-13, NHI HE-05741-06, NHI HE-5443-07, and HRC U-1740.

A method is described for calculating a unique distribution of both the oxygen diffusing capacity and the blood flow in the well- and poorly-ventilated parts of the lungs of patients with obstructive lung disease. It affords a new method of determining the oxygen diffusing capacity, taking into account the uneven ventilation and perfusion of the lung in these patients. The data needed are the arterial oxygen saturation while breathing four different inspired gas mixtures (i.e., air, 24, 30, and 100% oxygen), the oxygen consumption, and the nitrogen washout curve. The method uses Bohr integral isopleths and ventilation-perfusion ratio isopleths, both superimposed simultaneously upon the oxygen dissociation curve. A worked example illustrating the method of calculation is given in detail. The advantage of this method is that it gives a comprehensive picture of oxygen exchange and of the distribution of ventilation, perfusion, diffusing capacity, and lung volume without having to resort to the use of a digital computer.

## A67-82030

### EFFECT OF GAS DENSITY ON MECHANICS OF BREATHING.

Domenic A. Maio and Leon E. Farhi (N. Y. State U., Dept. of Physiol., Buffalo).

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 687-693. 16 refs.

Contract Nonr 969(03).

Density of the gas inspired by three adult sitting males was changed by varying gas composition and/or ambient pressure, and the effects on respiratory resistance, maximum voluntary ventilation (MVV), and maximum flow were determined. When the same gas density was obtained by two different combinations of composition and pressure, there was no significant difference. The nonelastic pressure,  $P_{non-el}$ , required to move a gas of density  $D$  at a flow rate  $\dot{V}$  is given by the empirical equation  $P_{non-el} = 0.40 (D + 0.70) \dot{V}^{1.6}$ . When gas density is three times that of air at sea level, MVV drops to 50% of control value. Maximum flow decreases similarly. Flow and MVV are limited by a combination of airway resistance and time required for muscle shortening. With no gas in the airway, the intrinsic pump factors would limit the rate of change of lung volume to 14 liters-sec.<sup>-1</sup>

## A67-82031

### VERTICAL GRADIENT OF ALVEOLAR SIZE IN LUNGS OF DOGS FROZEN INTACT.

J. B. Glazier, J. M. B. Hughes, J. E. Maloney, and J. B. West (Roy. Postgraduate Med. School, Dept. of Med., Clin. Respirat. Physiol. Res. Group, London, Great Britain).

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 694-705. 21 refs.

MRC and NHI supported research.

Dog lungs were fixed in situ by freezing and alveolar size measured by histologic morphometric techniques. In the erect lung at functional residual capacity the apical alveoli were about four times larger by volume than the basal ones, most of the change in size being over the upper 10 cm. of lung. The difference between apex and base increased to 11:1 when the animals were exposed to 3 g on a centrifuge. No difference in size was found when the lungs were expanded by 30 cm. H<sub>2</sub>O pressure. In horizontal lungs, alveolar size was the same at the apex and base, but the most superior alveoli were larger than the dependent ones. In inverted dogs alveolar size was uniform from apex to

base. The differences in alveolar volume can be explained if the transpulmonary pressure at any level is determined by the cross-sectional area of the lung and the weight of the lung below that level. This pressure apparently changes more rapidly in the upper part of the erect lung than in the lower part.

## A67-82032

### DETERMINATION OF DISSOLVED N<sub>2</sub> IN BLOOD AND INVESTIGATION OF N<sub>2</sub> WASHOUT FROM THE BODY.

A. C. Groom, R. Morin, and L. E. Farhi (N. Y. State U., Dept. of Physiol., Buffalo).

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 706-712. 10 refs.

Contract AF 33(657)10082.

The magnitude of the N<sub>2</sub> store of the body and the exchange of N<sub>2</sub> between the body and its environment were investigated in anesthetized dogs, breathing 100% O<sub>2</sub> in the absence of cutaneous transfer of N<sub>2</sub> from the atmosphere. For this study, the concentrations of dissolved N<sub>2</sub> in mixed venous and arterial blood were measured at various times after the start of O<sub>2</sub> breathing. Since the results presented are critically dependent on an adequate (and heretofore unavailable) method of analysis, the latter, which allows the measurement of low N<sub>2</sub> concentrations with an accuracy equivalent to  $\pm 1.0$  mm. P<sub>N<sub>2</sub></sub>, is described in detail. The kinetics of N<sub>2</sub> washout were equivalent to those from a simple three-compartment model. The "compartments", representing 69.1, 23.5, and 7.4% of the total N<sub>2</sub> store, gave desaturation half-times of 117, 135, and roughly 1.5 min., respectively, equivalent to perfusion by 8.7, 24.8, and 66.5% of the cardiac output. The total N<sub>2</sub> store of the body was  $22.5 \pm 3.1$  (SE) ml. N<sub>2</sub> (STPD)-kg.<sup>-1</sup>.

## A67-82033

### PREDICTION OF MUSCLE AND REMAINING TISSUE PROTEIN IN MAN.

Kenneth S. K. Chinn (Fitzsimons Gen. Hosp., U.S. Army Med. Res. and Nutr. Lab., Physiol. Div., Denver, Colo.).

*Journal of Applied Physiology*, vol. 23, Nov. 1967, p. 713-715. 12 refs.

Body composition, total body potassium, and urinary creatinine excretion were determined in 15 males. Creatine conversion rate, total body potassium, and urinary creatinine excretion were used in deriving equations for predicting muscle protein (MP), nonmuscle protein (NMP), and total body protein (P). To verify the accuracy of the predicted amount of MP and NMP, P predicted from total body potassium and urinary creatinine excretion was compared with P calculated from densitometric measurement. A highly significant correlation ( $r = 0.912$ ,  $P < 0.01$ ), and a standard deviation of  $\pm 5.06\%$  were obtained.

## A67-82034

### FURTHER OBSERVATIONS ON CONTRALATERAL REMOTE MASKING AND RELATED PHENOMENA.

W. Dixon Ward (Minn. U., Dept. of Otolaryngol., Hearing Res. Lab., Minneapolis).

*Journal of Acoustical Society of America*, vol. 42, Sep. 1967, p. 593-600. 27 refs.

PHS supported research.

Previous knowledge is reviewed relevant to contralateral remote masking (CRM) the elevation in threshold of low-frequency sinusoid in the presence of a high-frequency band of noise in the opposite ear—and a series of additional observations is presented. CRM is nearly as great (1) in ears with paralyzed middle-ear muscles as in normal ears, (2) for bone-conducted as for air-conducted test tones, or (3) when a 50-msec. tone pulse occurs simultaneously with the onset of the masking pulse as when it is presented half

a second later. Furthermore, (4) the gradual decrease of CRM with time, in the presence of a sustained masker, is not affected by abrupt changes in frequency or level of the masker, and (5) only a low negative correlation between CRM and auditory fatigue exists. These facts all indicate that the middle-ear muscles play only a minor role in CRM. The course of adaptation of CRM is shown to parallel the course of development of prestimulatory fatigue. It appears, therefore, that CRM represents primarily central masking arising at one or more centers receiving afferent innervation from both right and left ears, and that the change in time of CRM can be ascribed to adaptation processes either in the noise channel or, via the efferent system, in the contralateral channel. Implications of this formulation in regard to auditory fatigue from diotic and dichotic exposure to noise is discussed.

#### A67-82035

##### MEASURING FOOD ACCEPTABILITY BY FREQUENCY RATINGS.

Doris D. Schuh, Aimee N. Moore, and Byrdine H. Tuthill (Mo. U., Med. Center, Dept. of Nutr. and Dietetics, Columbia). *Journal of the American Dietetic Association*, vol. 51, Oct. 1967, p. 340-343. 7 refs.

An experiment was designed to test the validity of the frequency rating technique in measuring acceptability of computer-planned menu items. Frequency rating questionnaires containing 100 menu items were administered to 105 patients, and the median frequency rating for each menu item was determined. Twenty-four items from the general menu were then selected to test the validity of the technique. During a period of six weeks, these menu items were served at various frequencies. Plate waste was used to measure their acceptability. Statistical tests showed significant differences in the waste patterns of six of the menu items tested. However, for all but one, French-style green beans, the direction of change was erratic. Therefore, these statistical findings were of no practical significance. From these findings, it can be concluded that the frequency rating technique is probably not a valid measure of population attitude toward frequency of service of menu items in an institution with a relatively rapid turnover in population. Also, it would not be a valid technique when the educational level is low, because this probably produces responses which may not be true indications of attitude.

#### A67-82036

##### HYPERBARIC OXYGEN THERAPY IN CARBON MONOXIDE POISONING [L'OSSIGENOTERAPIA IPERBARICA NELLA INTOSSICAZIONE ACUTA DA OSSIDO DI CARBONIO].

D. Zannini, L. Fontana, B. Bogetti, and G. Viotti (Genoa U., Inst. of Med. Work, Italy). *Lavoro e Medicina*, vol. 21, Jan.-Feb. 1967, p. 15-26. 16 refs. In Italian.

Ten patients suffering from severe carbon monoxide poisoning were treated with hyperbaric oxygen at a pressure of 2.2 to 2.8 ata. The clinical results and the elimination of carbon monoxide during the treatment were satisfactory. In all cases consciousness was rapidly restored, the neurological signs subsided in a very short time and the patients made a full and complete recovery.

#### A67-82037

##### EFFECTS OF COLOR, RELATIVE POSITION, AND THE ONSET OR OFFSET OF SIGNALS IN A WATCHKEEPING TASK.

Joel S. Warm, Earl A. Alluisi (Louisville U., Ky.), and Michel Loeb (U. S. Army Med. Res. Lab., Fort Knox, Ky.) *Psychonomic Science*, vol. 9, Sep. 15, 1967, p. 95-96. 11 refs. Contract DA-49-193-MD-2567.

The present study was designed to isolate the relative effects of three stimulus parameters on performance in a one hr. watchkeeping task. The task required the subject to monitor a display consisting of a red and a green light mounted one above the other. One of the lights was normally on (offset was the critical signal), and the other was normally off (onset critical). A total of 128 subjects served in four groups that permitted all factorial combinations of color (red or green), spatial position (top or bottom light of the display), and direction of energy change (stimulus onset or offset). Response times were found to be more rapid for signal offset than for onset, and for the bottom as compared to the top light of the display. No significant effect was noted for color or for any of the interactions.

#### A67-82038

##### ORDER OR REPORT AND EAR ASYMMETRY IN DICHOTIC LISTENING.

Anita Cooper, Karl Achenbach, Paul Satz, and C. Michael Levy (Fla., U., Center for Neurobiol. Sci. and Dept. of Psychol., Gainesville). *Psychonomic Science*, vol. 9, Sep. 15, 1967, p. 97-98. 11 refs. Grants NSF GY-995 and NIH MH 12046.

This study is an attempt to reduce some confusion over reports of an ear asymmetry effect in the dichotic listening paradigm and to assess the criticism that the effect is artifactual. A within-S design was used in which six pairs of digits per trial were presented at 2 pair/sec. When order of report was controlled, a dramatic ear asymmetry and a clear ear order effect was evident. The orthogonality of these effects implies that the asymmetry is not an artifact of order of reporting.

#### A67-82039

##### TIME-SHARED, PERCEPTUAL-MOTOR SKILLS DURING 7 DAYS OF ISOLATION.

Seward Smith and Thomas I. Myers (Naval Med. Res. Inst., Bethesda, Md.).

*Psychonomic Science*, vol. 9, Sep. 15, 1967, p. 99-100. 8 refs.

Forty subjects attempted to remain in dark, quiet sensory deprivation (SD) for seven days. Twenty subjects lived individually in a live-in-the-lab control condition (C) affording much recreational activity. Nineteen SDs but only one C requested early release. SDs out-performed Cs on time-shared perceptual-motor task which involved tracking, turning off location-coded tones, and turning off a noise. These data are further evidence that performance enhancement sometimes occurs during SD.

#### A67-82040

##### THE EFFECT OF LOW LEVELS OF STIMULUS INTENSITY UPON THE ORIENTING RESPONSE.

Anita Leavy and James H. Geer (Pa. U., Philadelphia).

*Psychonomic Science*, vol. 9, Sep. 15, 1967, p. 105-106. 8 refs.

Grant PHS MH-12301-01.

The prediction of an inverse relationship between Orienting Response (OR) strength and low levels of stimulus intensity was tested using 48 subjects and four stimulus intensity conditions. Galvanic skin responses (GSRs) to a series of tones, 20, 30, 40, or 50 db. in intensity, were employed as the measure of the OR. When spontaneous GSR frequency was held constant, OR resistance to habituation was found to be a direct function of stimulus intensity, contrary to the previous prediction.

#### A67-82041

##### EFFECTS OF CHRONIC CENTRIFUGATION AT 3 G'S ON CARDIOVASCULAR REFLEXES OF THE RAT.

## A67-82042

Brian R. Duling (Iowa U., Coll. of Med., Dept. of Physiol. and Biophys., Iowa City).  
(*Federation of Am. Soc. for Exptl. Biol., Atlantic City, N. J., Apr. 1966*). *American Journal of Physiology*, vol. 213, Aug. 1967, p. 466-472. 30 refs.

Grants PHS 2 T01 GM 225 and PHS GM10093.

Male Simonsen rats weighing 260-300 g. at the onset of exposure were centrifuged at 3 g's (36.1 r.p.m.) for four wk. After anesthetization with pentobarbital (ip), peripheral resistance measurements were made on the isolated hindquarters perfused at constant flow. Vascular reflex changes, in response to systemic pressure alterations induced by epinephrine or acetylcholine, were compared in 12 centrifuged and 12 noncentrifuged animals. Centrifuged rats exhibited a significantly greater alteration in peripheral resistance for a given change in systemic pressure. These findings suggest that cardiovascular reflex function is influenced by the characteristics of the inertial environment. The use of nitrous oxide anesthetic and stimulation of the lumbar sympathetic chain failed to demonstrate that this effect was specifically related to the anesthetic or due to an alteration in the peripheral neuroeffector unit.

## A67-82042

### SOME CHARACTERISTICS OF TEMPERATURE REGULATION IN THE UNANESTHETIZED DOG.

B. Hellström and H. T. Hammel (John B. Pierce Found. Lab., New Haven, Conn.).

*American Journal of Physiology*, vol. 213, Aug. 1967, p. 547-556. 29 refs.

Contracts DA-49-193-MD-2676 and AF 33-(615)-2825.

An attempt has been made to ascribe the regulation of body temperature in homeotherms to the hypothalamus and the preoptic region. Results of measurements of hypothalamic temperature and regulatory responses in the normal dog in hot, neutral, and cold environments and in the resting, waking state are interpreted on the assumption that the hypothalamus responds to changes in its own temperature like a proportional controller with an adjustable set point. The controlling equations relating panting and shivering responses to the activating signal appear to be of the form  $R-R_0 = \alpha_R(T_{Hypo} - T_{SetR})$ ,  $R-R_0 \geq 0$ . For all environmental temperatures, the proportionality constant for the shivering response was between  $-1$  and  $-1.5$  kcal.  $kg^{-1}$   $hr^{-1}$   $^{\circ}C^{-1}$ . The proportionality constant for panting was  $2-3$  kcal.  $kg^{-1}$   $hr^{-1}$   $^{\circ}C^{-1}$  and was the same for all environmental temperatures. The set temperature for all regulatory responses increases in the cold environment and decreases in the hot environment. The set temperature for panting exceeds the set temperature for shivering by about  $2^{\circ}C$ . in cold environment (avg. skin temp.,  $T_{AS}=33^{\circ}C$ ),  $2-3^{\circ}C$ . in neutral environment ( $T_{AS}=35^{\circ}C$ ) and possibly  $4^{\circ}C$ . in hot environment ( $T_{AS}=37^{\circ}C$ ). The set temperature for vasoconstriction is between that for shivering and panting. A high internal body temperature lowers all set temperatures and a low internal body temperature increases all set temperatures without affecting the proportionality constants.

## A67-82043

### URINARY ERYTHROPOIETIN IN MEN SUBJECTED TO ACUTE HYPOXIA.

Alberto O. Carmona, Nydia Garcia de Testa, and F. Luisa Frias (Inst. Munic. de Hematol., Buenos Aires, Argentina).

*Proceedings of the Society for Experimental Biology and Medicine*, vol. 125, Jun. 1967, p. 441-443. 20 refs.

Inst. de Biol. Andina, Lima, Peru and Consejo Nacl. Invest. Cient. y Tecn., Argentina supported research.

The urinary erythropoietin (EP) content of residents at sea level, were measured during a five-day sojourn at 14,900 ft. An

early EP rise was found with the peak on the second or third day of exposure. Thereafter, activity declined. The rapid increase in activity was considered to reflect the response to a severe hypoxic stimulus, and the subsequent decrease, utilization of the hormone by an active erythroid bone marrow.

## A67-82044

### EFFECT OF DIMETHYL SULFOXIDE ON PLASMA ENZYME CHANGES IN X-IRRADIATED RATS.

Benjamin Highman, John R. Hansell, and David C. White (Natl. Inst. of Health, Bethesda, Md.; Natl. Center for Radiol. Health, Rockville, Md.; and Armed Forces Inst. of Pathol., Washington, D. C.).

*Proceedings of the Society for Experimental Biology and Medicine*, vol. 125, Jun. 1967, p. 606-610. 15 refs.

Rats were given intraperitoneally 10 ml./kg. 0.85% saline or 5.5 g./kg. 50% dimethyl sulfoxide (DMSO), a radioprotective compound, before exposure to 800 r whole-body X-irradiation. Values of plasma glutamic oxalacetic (GOT) and pyruvic (GPT) transaminases, aldolase, alkaline phosphatase, and lactic and malic dehydrogenases were determined. In non-irradiated controls, DMSO elevated plasma GOT and GPT values at six hr. and aldolase at 6 to 48 hr. Values were normal 3 to 12 days after DMSO. In irradiated rats given saline or DMSO, plasma GOT was higher than in non-irradiated controls at six hr. and then fell, along with the other enzymes, to subnormal values at 3 to 12 days. Levels of GOT, GPT and aldolase were higher 6 to 24 hr. after irradiation in rats given DMSO than in those given saline. A second dose of DMSO caused a proportionally similar elevation when given two days after irradiation, but had relatively little effect on enzyme levels when given five days after irradiation. Pretreatment with DMSO did not prevent the fall in enzyme values noted 3 to 12 days after X-irradiation and had no marked effect of histologic changes. It was concluded that X-irradiation caused an initial widespread increase in cellular permeability followed by a decrease, and that plasma enzyme changes do not explain the radioprotective action of DMSO and are unreliable guides in evaluating the possible radioprotective effect of different compounds.

## A67-82045

### EFFECTS OF DIURNAL VARIATION IN PLASMA CORTICOSTERONE LEVELS ON ADRENOCORTICAL RESPONSE TO STRESS.

E. Zimmerman and V. Critchlow (Baylor U., Coll. of Med., Dept. of Anat., Houston, Tex.).

*Proceedings of the Society for Experimental Biology and Medicine*, vol. 125, Jun. 1967, p. 658-663. 12 refs.

Grants PHS AM-3385, PHS GM-46, and PHS 3K3-GM-15, 364-04.

Adult female rats were subjected to three-minute ether or immobilization stress during the trough (08:30) or peak (16:30) of the circadian rhythm in adrenocortical function. Two samples of peripheral plasma were obtained from each rat for fluorometric determination of corticosterone concentrations; the first was collected in less than three min. and the second at 15 min. following initiation of stress. Adrenals were also collected 15 min. after stress for determination of corticosterone levels. Corticosterone concentrations in the first or "nonstress" plasma samples collected in the afternoon were two to three times higher than those obtained in the morning. Nevertheless, stress-induced increments in steroid levels did not differ significantly at the two times of day. Although adrenal concentrations of corticosterone 15 min. following onset of stress in the morning were similar to those following stress in the afternoon, the changes observed in plasma suggest that acute pituitary-adrenal responses to the types of stress used are not altered by marked diurnal variation in plasma corticosterone levels.

**A67-82046****PHOTIC-STIMULATION IN THREE SPECIES OF BABOONS.**

E. K. Killam, L. G. Stark, and K. F. Killam (Stanford U., School of Med., Stanford Med. Center, Dept. of Pharmacol., Palo Alto, Calif.). *Life Sciences*, vol. 6, Aug. 1, 1967, p. 1569-1574. 7 refs. Grants NIH MH 03241 and NIH GM 322; Southwest Found. for Res. and Educ. and Stanford U. supported research.

A study was presented which investigated the inherent nature of photosensitivity in the baboon by analysis of the response to flickering light. Electroencephalographic (EEG) recordings were obtained from animals subjected to photic stimuli of varying lengths and frequency. The abnormal response to intermittent light stimulation varied from minimal EEG abnormalities to major seizures accompanied by self-sustained epileptiform discharges. Indications that a stable, high percentage of baboons of the species *Papio papio* presents evidence of photomyoclonic epilepsy were confirmed.

**A67-82047****FLICKER STIMULATION WITH CHIMPANZEES.**

R. Naquet, K. F. Killam, and J. M. Rhodes (Stanford U., School of Med., Stanford Med. Center, Dept. of Pharmacol., Palo Alto, Calif. and N. Mex. U., Dept. of Psychol., Albuquerque). *Life Sciences*, vol. 6, Aug. 1, 1967, p. 1575-1578. 9 refs. Contract AF 29(600)-5604 and Grant PHS MH 03241.

Since only man has been known to have idiopathic photo-sensitive epilepsy, experiments were conducted in order to determine if any other Hominioidea would show a similar response. Electroencephalographic (EEG) recordings were made in chimpanzees subjected to photic stimulation. The results with all animals were negative. The chimpanzee EEG seemed to be more similar to that of man than monkey. High photic sensitivity such as that seen in the baboon, *Papio papio* was ruled out.

**A67-82048****ENHANCEMENT OF RESPIRATION AND FERMENTATION IN ALGAE BY BLUE LIGHT.**

W. Kowalik and H. Gaffron (Fla. State U., Inst. of Mol. Biophys., Tallahassee). *Nature*, vol. 215, Sep. 2, 1967, p. 1038-1040. 19 refs. NASA supported research.

A mutant of *Chlorella vulgaris*, free from chlorophyll but containing carotenoids, was used to investigate the effect of blue light on the dark metabolism. Blue light enhanced the rate of endogenous respiration without any change in the respiration quotient. The pH of the culture medium had no influence on the blue light effect. When anaerobically incubated algae were exposed to blue light, an increase in the release of fermentation products was noted. The farther removed conditions were from those considered optimal, without being harmful, the easier it was to find the difference between metabolic rates in darkness and weak blue light. It was suggested that blue light served as a regulating factor. It seemed fairly certain that blue light did not act directly on respiration or fermentation, but on the release of some carbohydrate.

**A67-82049****A COMPARISON OF THE PHYSICAL WORK CAPACITY OF INDIVIDUALS AS DETERMINED BY VARIOUS TASKS.**

C. G. Williams, C. H. Wyndham, A. J. N. du Raan, R. Kok, and A. Heyns (Transvaal and Orange Free State Chamber of Mines, Phys. Sci. Lab., Johannesburg, South Africa). *Internationale Zeitschrift für angewandte Physiologie*, vol. 24, no. 2, 1967, p. 102-110. 9 refs.

The maximum oxygen intake of nine male subjects was determined on a step-test and while they were working at maximum

rates on tramming and on the treadmill. For all tasks three repeated measurements of oxygen intake and heart rates were made at each level of work. Estimates of the maximum oxygen intake of the nine men, based on the data obtained from laboratory tasks such as running on the treadmill and stepping on and off a stool 12 in. high, were very similar to estimates based on an industrial task such as tramming a mine car. Results obtained during treadmill running and tramming agreed more closely with each other than the data obtained during the stepping test agree with those obtained from either the treadmill or tramming. Use of the individual's own maximum heart rate (obtained during the treadmill tests) improved estimates of maximum oxygen intake for the step-test, whereas the use of the group mean heart rate of 184 beats/min., instead of 180 beats/min., improved estimates even further.

**A67-82050****NON-LINEAR RESPONSE OF THE HUMAN CORNEORETINAL POTENTIAL TO SINUSOIDAL CHANGES IN LIGHT INTENSITY.**

D. Woodrow Benson, Jr., Hansjörg Kolder, and Louis D. Homer (Emory U., Atlanta, Ga.).

(*Eng. in Med. and Biol., Ann. Conf., San Francisco, Calif., 1966*). *Pflügers Archiv für die gesamte Physiologie*, vol. 295, no. 4, 1967, p. 361-368. 6 refs.

Grants NIH T5-GM-1607, NIH 3T1-NB-5323, and NIH FR-5364.

A step change in light intensity evokes a damped oscillation in the human corneoretinal potential. A mathematical model has been developed to describe this damped oscillation. The present study was conducted in order to explore the linearity of the servomechanism hypothesized in this model. Data were obtained from 11 test subjects who had been exposed for at least four hr. to light whose intensity varied sinusoidally; the periods of the forcing function were between 15 and 32 min. A truncated Fourier series was fitted to the response. It was found that inclusion of the harmonic terms improved the fits significantly. These findings indicate that the system is a non-linear one.

**A67-82051****PERIPHERAL CHEMORECEPTOR RELEASE OF RESPIRATORY AND CIRCULATORY RESPONSES THROUGH INCREASING THE CO<sub>2</sub> PRESSURE IN LARGE MUSCLE GROUPS [AUSLOSUNG PERIPHERER NEUROGENER ATMUNGS- UND KREISLAUFANTRIEBE DURCH ERHOHUNG DES CO<sub>2</sub>-DRUCKES IN GRÖßEREN MUSKELGRUPPEN].**

Jürgen Stegemann, Hans-V. Ulmer, and Dieter Böning (Cologne U., Inst. of Normal and Pathol. Physiol., West Germany).

*Pflügers Archiv für die gesamte Physiologie*, vol. 293, no. 2, 1967, p. 155-164. 9 refs. In German.

Experiments were performed to find the adequate stimulus for peripheral muscle chemoreceptors which are assumed to control respiration and circulation during exercise. It could be shown that occlusion of blood flow in the hind limbs of dogs by inflating a small rubber balloon in the abdominal aorta caused similar respiratory and circulatory responses as described in previous papers when the blood flow in the legs of humans was occluded by inflating cuffs. Furthermore, equal volumes of gaseous CO<sub>2</sub> were bubbled alternately into the inferior vena cava and the abdominal aorta. When CO<sub>2</sub> was bubbled into the inferior vena cava, heart rate and blood pressure remained constant, the respiration and the end tidal CO<sub>2</sub>-pressure (p<sub>A</sub>CO<sub>2</sub>) were slightly increased. Insufflation of CO<sub>2</sub> into the abdominal aorta, however, caused a marked increase in heart rate, blood pressure and total ventilation (V<sub>E</sub>) while end tidal pCO<sub>2</sub> was considerably decreased. When CO<sub>2</sub> was replaced by nitrogen no effects could be observed. It was therefore concluded that the effects are specific for CO<sub>2</sub>.

## A67-82052

**EFFECT OF CAFFEINE, NICOTINE AND ETHANOL ON LIPOLYSIS IN HUMAN ADIPOSE TISSUE.**

Maurice Verdy (Hôp. Hôtel-Dieu, Sect. d'endocrinol. et nutr., Montréal, Canada).

*Revue Canadienne de Biologie*, vol. 26, Sep. 1967, p. 179-184. 29 refs.

Conseil des rech. med., Canada and Hôtel-Dieu supported research.

The rate of lipolysis was studied in human adipose tissue in vitro by measuring the glycerol released in the incubation medium. Ethanol had no constant effect, even at doses of 4 mg./ml. Small doses of caffeine ( $10^{-4}$  M) failed to affect lipolysis or potentiate the lipolytic effect of adrenaline; but higher doses ( $10^{-3}$  M) did exert a lipolytic effect. Nicotine ( $10^{-4}$  M) had no direct effect, but reduced the lipolytic activity of adrenaline by 20%.

## A67-82053

**EXPERIMENTAL STUDIES ON KEROSENE POISONING.**

M. J. Narasimhan, Jr. and V. G. Ganla (B. J. Med. Coll., Physiol. Res. Center, and Sassoon Gen. Hosps., Poona, India).

*Acta Pharmacologica et Toxicologica*, vol. 25, no. 2, 1967, p. 214-224. 11 refs.

Cases of death of children following accidental oral ingestion of kerosene have frequently been reported in India and western countries. Previous workers indicated that death was the result of aspiration of kerosene into the lungs. Present experiments carried out on mice, rabbits and dogs showed that the primary cause of death following oral ingestion of kerosene was impairment of liver function and resultant hypoglycemia leading to convulsions and coma. No inflammatory reactions of any kind were seen in the lungs except hyperemia.

## A67-82054

**SALIVARY FLOW AND THIRST.**

J. Sobocińska and S. Kozłowski.

*Bulletin de l'Académie Polonaise des Sciences*, vol. 15, no. 5, 1967, p. 295-299. 12 refs.

Changes in salivary flow in dogs, induced by atropine or pilocarpine, exert no influence on the thirst threshold. The administered atropine and pilocarpine doses reduce the amount of water drunk under the influence of the threshold osmotic stimulus. The results obtained are discussed as an argument against the "dry mouth theory".

## A67-82055

**ON THE RELATIONSHIP BETWEEN PHENOMENAL SPACE AND PHENOMENAL VELOCITY.**

Ronald L. Cohen (Uppsala U., Dept. of Psychol., Sweden).

*Scandinavian Journal of Psychology*, vol. 8, no. 2, 1967, p. 107-112. 6 refs.

The hypothesis that changing the phenomenal distance traversed by a moving spot, while keeping the physical distance constant, should affect the phenomenal velocity in a like direction was tested by having the stimulus motion path bounded by Müller-Lyer figures. It was found that while these affected motion path length judgments in the same direction as static length judgments, they did not have a corresponding effect on velocity judgments. The Müller-Lyer figure producing a decreased length judgment was actually found to increase velocity judgments. Two possible explanations of this result were tested and the conclusion drawn that this increase could be due to the enclosing nature of the Müller-Lyer figure in question.

## A67-82056

**CATECHOLAMINE EXCRETION, PERFORMANCE, AND SUBJECTIVE STRESS.**

Paula Pátkai, Marianne Frankenhaeuser, Anita Rissler, and Christer Björkvall (Stockholm U., Psychol. Labs. and Swed. Med. Res. Council, Exptl. Psychol. Unit, Sweden).

*Scandinavian Journal of Psychology*, vol. 8, no. 2, 1967, p. 113-122. 17 refs.

Swed. Med. Res. Council, Swed. Council for Social Sci. Res., and Stockholm U. supported research.

Psycho-endocrine relations were explored in 52 students exposed to moderately stressful psychological tests demanding selective attention. Subjects with high excretion rates of adrenaline performed better during the entire stress session than did subjects with low adrenaline excretion. The level of subjective stress increased consistently throughout the session in subjects with low excretion rates of adrenaline, while it remained relatively constant in subjects with high adrenaline excretion. No consistent relationship could be demonstrated between noradrenaline excretion and the psychological variables. Possible effects on the catecholamine-excretion patterns of factors such as severity and duration of the stress are discussed.

## A67-82057

**USE OF RADIOTELEMETRY OF CLINICAL STUDY OF THE STOMACH [PRIMENENIE RADIOTELEMETRII DLIJA KLINICHESKOGO ISSLEDOVANIJA ZHELUDKA].**

V. A. Timakov and I. I. Fishzon-Ryss (S. M. Kirov Mil.-Med. Acad., Leningrad, USSR).

*Terapevticheskii Arkhiv*, vol. 39, Aug. 1967, p. 57-61. 20 refs. In Russian.

Gastric functions in 164 patients with different lesions of the stomach were investigated using a radiotelemetric method. Valuable information on several aspects of gastric acid secretion and its changes in certain diseases was obtained. A curve for transferring pH figures into titration units of acidity was given. Correlations between intragastric pH and the acidity of extracted gastric contents were analyzed, as well as probable causes for discrepancies. A "double alkaline" test was recommended for the study of the function of gastric glands, and the criteria for its clinical value were analyzed. Radiometric studies of the intragastric temperature in patients with burns facilitated judgment of the degree of thermoregulation and local circulatory disturbances in such cases.

## A67-82058

**SEVERAL MILITARY MEDICAL PROBLEMS OF ENVIRONMENTAL HYGIENE ON BOARD SHIPS FROM AN OCCUPATIONAL VIEWPOINT [EINIGE WEHRMEDIZINISCHE PROBLEME AN BORD AUS ARBEITSMEDIZINISCHER SICHT ARBEITSPLATZHYGIENE AN BORD].**

H. G. Schwarz.

*Wehrmedizinische Monatsschrift*, vol. 11, no. 5, 1967, p. 107-111. In German.

The problems of environmental hygiene aboard a Navy vessel were described from an occupational medicine point of view. The ABC-protected vessels of the Navy, aboard which work has to be performed under conditions similar to a "windowless room" and which simultaneously serve as recreation rooms and as dormitories for the crew, pose occupational-hygienic problems to the physician. Staying aboard a vessel may lead to apathy of the individual, and lack of daylight and different artificial light sources may cause visual disturbances. The rapid change of climatic conditions aboard a vessel must be considered. As not every room aboard a vessel can be air-conditioned as required, and only a ventilation system is present, climatic problems occur. Despite the

isolation of numerous machines and ventilators the crew is exposed to noise and vibration. The continuous climatic changes aboard a vessel must be considered for the selection of working attire. The most frequent diseases and accidents are due to the crowded living conditions aboard a vessel.

#### A67-82059

#### EXAMINATION OF THE INCREASE OF FIBRINOLYTIC ACTIVITY IN THE BLOOD OF STARFIGHTER PILOTS AS A CRITERION FOR THEIR STRESS [UNTERSUCHUNGEN UBER DIE STEIGERUNG DER FIBRINOLYTISCHEN AKTIVITÄT IM BLUT VON STARFIGHTER-PILOTEN ALS MASS FÜR IHRE BEANSPRUCHUNG].

E. Kihnke (Bonn U., Physiol. Inst., West Germany).

*Wehrmedizinische Monatsschrift*, vol. 11, no. 5, 1967, p. 137-142. In German.

The influence of flying on the fibrinolytic activity in the blood of starfighter pilots was investigated by means of euglobulin-phagotyping. A few samples were used to illustrate the increase in activity and its dependence on the duration of flying and the flying order. The effects on the coagulation system were discussed. As a criterion for the degree of stress, the increase in activity observed after defined flights were compared with those observed after a cross-country run of 4,000 m.

#### A67-82060

#### IS THE WOUFFE BOTTLE AN EFFICIENT HUMIDIFIER FOR OXYGEN?

Bernard J. Freedman (King's Coll. Hosp., London, Great Britain). *British Medical Journal*, vol. 3, Jul. 29, 1967, p. 277-279. 6 refs.

The method of humidifying oxygen by bubbling it through water in a Wouffe bottle has been criticized. This method was tested by bubbling oxygen at three flow-rates (3, 5, and 8 liter/min.) and at three ambient temperatures (approximately 12°, 20°, and 32°C.). The relative humidities ranged from 60 to 82%, and water-vapor concentrations from 7.95 to 22.74 g./cu. m. During the first few minutes of bubbling, before appreciable cooling had occurred in the water in the Wouffe bottle, the humidities were still higher. It is thought that humidification of oxygen by this method is adequate for the treatment of most chest infections and for non-respiratory disorders requiring oxygen. Attention is again drawn to the fallacy of accepting relative humidity alone as a measure of the humidification of gases for inhalation. The need to use measurements of water-vapor concentrations for this purpose is emphasized. A family of curves was drawn to facilitate calculation of water-vapor concentration when the relative humidity and temperature are known.

#### A67-82061

#### AUDITORY CONTINUITY EFFECTS AS A FUNCTION OF THE DURATION AND TEMPORAL LOCATION OF THE INTERPOLATED SIGNAL.

Lloyd F. Elfner and Jerry L. Homick (Kent State U., Ohio).

*Journal of the Acoustical Society of America*, vol. 42, Sep. 1967, p. 576-579. 6 refs.

NSF supported research.

The present experiment employed 20 college students who demonstrated an ability to make determinations of interruption or continuity in a random noise signal that alternated with a tonal burst. The primary purpose of this experiment was to investigate the effects of the duration and the temporal location of the interpolated signal on the perception of continuity under monaural presentation. The effect of frequency of the interpolated tone was also

evaluated. The results showed that the perception of continuity in the noise was affected by both the duration and frequency of the interpolated tonal signal. The location of the interpolated signal had no significant differential effect on continuity thresholds.

#### A67-82062

#### CONTRALATERAL MASKING: AN ATTEMPT TO DETERMINE THE ROLE OF THE AURAL REFLEX.

Kjell Gjaevenes and Erik Vigran (Oslo U., Inst. of Physics, Blindern, Norway).

*Journal of the Acoustical Society of America*, vol. 42, Sep. 1967, p. 580-585. 13 refs.

Poststimulatory contralateral masking of pure tones at frequencies 200-1000 c.p.s. are determined on normal-hearing subjects. The masker was a high-frequency band noise. Delay interval and noise level have been varied. The masking effect is most probably caused by the middle-ear muscle reflex, but it seems not possible, on the basis of the experiments, to decide whether other mechanisms also are involved.

#### A67-82063

#### AUDITORY INTENSITY DISCRIMINAL SCALE I. EVIDENCE DERIVED FROM BINAURAL INTENSITY SUMMATION.

Michel Treisman (Bell Telephone Labs., Inc., Murray Hill, N. J.) and R. J. Irwin (Auckland U., Dept. of Psychol., New Zealand).

*Journal of the Acoustical Society of America*, vol. 42, Sep. 1967, p. 586-592. 27 refs.

Med. Res. Council supported research.

The problem of scaling the central effect of auditory stimulus intensity,  $I$  (in power units), is considered, and it is argued that there need not be a unitary neurophysiological correlate for "loudness." Different psychophysical tasks may draw on different central measures of stimulus intensity. A "metric dimension,"  $L$ , which the subject may use in making quantitative judgments, is distinguished from a more peripheral "discriminal dimension,"  $E$ , involved in the immediate processing of the stimulus input. Binaural intensity summation data are used to derive the form of the function relating  $E$  to  $I$ , and it is shown that for any particular range of intensities this can be approximated by a power function,  $E = kI^n$ , where the exponent  $n$  depends on the range of intensities used, approximating one near the absolute threshold and decreasing as over-all intensity increases. On the assumption that with binaural stimulation the over-all loudness is determined by the sum of  $E_L$  and  $E_R$ , the effects produced by the stimuli to the left and right ears, linear equaloudness curves are obtained.

#### A67-82064

#### THE PROBLEM OF PHYSIOLOGICAL ACTION OF A WORD ON THE STATE OF EXCITABILITY OF THE MOTOR ANALYZER [O FIZIOLOGICHESKOM DEISTVII SLOVA NA SOSTOIANIE VOZBUDIMOSTI DVIGATEL'NOGO ANALIZATORA].

M. M. Vlasova, A. N. Medvedev, and S. L. Rysakova.

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, Jul.-Aug. 1967, p. 616-626. 39 refs. In Russian.

A study was made of the mechanisms of second signal control of voluntary motor reactions. The experiments traced the influence of a verbal warning and the required reaction on electromyogram latency, the motor component of the reaction, and the time of achieving it. The verbal warning produced a regular decrease in the time of reaction. Decrease in the latency and the duration of the motor component occurred without disturbance of their usual time relations which existed before the verbal action. The more strictly the verbal warning was intended for definite motor coordinations, the shorter the time of reaction. The interval during which time differences appear for the first time is dissimilar in different subjects and amounts to at least 50 to 70 msec.

## A67-82065

**CHANGE OF SITUATIONAL CONDITIONED REFLEXES IN DOGS FOLLOWING LESION OF THE CAUDATE NUCLEI [IZMENENIE SITUATSIONNYKH USLOVNYKH REFLEKSOV U SOBAK POSLE POVREZHDENIIA KHVOSTATYKH IADER].**

V. I. Syrenskii (USSR Acad. of Med. Sci., I. P. Pavlov Inst. of Exptl. Med., Leningrad).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, Jul.-Aug. 1967, p. 602-608. 23 refs. In Russian.

Food motor activity was elaborated in dogs by the Kupalov method of situational conditioned reflexes. Lesion of the caudate nuclei led to a disturbance in the course of situational conditioned reflexes in all the animals. The disturbance was revealed both in a changed sequence of individual links and in the performance of each link. The gravity of the disturbances was in direct proportion to the extent of the lesion of the brain structures. The data obtained provide ground for the belief that the caudate nuclei participate in controlling the tone of the brain as a whole and of the motor analyzer in particular. Thus, along with the frontal lobes and the medial parts of the thalamus, the above formations are links of the morpho-functional system which controls the level of brain activity.

## A67-82066

**THE ROLE OF THE THALAMIC NUCLEI IN CONDITIONED ACTIVITY [ROL' TALAMICHESKIKH IADER V USLOVNORE-FLEKTORNOI DEIATEL'NOSTI].**

N. A. Shustin (USSR Acad. of Sci., I. P. Pavlov Inst. of Physiol., Lab. of Physiol. of Higher Nervous Activity of Animals, Leningrad). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, Jul.-Aug. 1967, p. 588-595. 27 refs. In Russian.

Delayed and trace conditioned reflexes (secretory and motor) and differentiations to them were elaborated and stabilized in fourteen dogs. This was followed by a one-stage bilateral electrolytic lesion of individual thalamic nuclei. Coagulation was achieved by applying a DC anode of 5 ma. for two min. Complete bilateral ablation of the medial or anterior groups of thalamic nuclei led to a sharp decrease in secretory food conditioned reflexes and to a disturbance of the structure of delayed and trace conditioned reflexes. Normal alternation of excitatory and inhibitory phases was disturbed. The general mobility and emotional manifestations were also diminished. The disturbances remained up to 14 mo. and were similar to those observed after the ablation of the frontal lobes. After an incomplete bilateral lesion of the medial or anterior thalamic nuclei, the reflex activity was completely restored in one to three mo. after the operation. Lesions of other thalamic nuclei, both non-specific and specific, resulted in a decrease in conditioned reflexes, and disinhibition of differentiation, without affecting the structure of delayed and trace conditioned reflexes.

## A67-82067

**THE STRUCTURAL AND FUNCTIONAL PECULIARITIES OF THE FORMATION OF CONDITIONED CONNECTION TO ACOUSTIC STIMULI [O STRUKTURNOFUNKSIONAL'NYKH OSOBENNOSTIYAKH ZAMYKANIIA USLOVNORE-FLEKTORNOI SVIAZI NA ZVUKOVYE RAZDRAZHITELI].**

T. A. Mering (USSR Acad. of Med. Sci., Inst. of Brain, Moscow). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, Jul.-Aug. 1967, p. 579-587. 51 refs. In Russian.

It was shown that differentiation of rings of bells and tones by frequency and intensity as well as of successive complexes of tones applied at usual time intervals, is preserved in dogs after a surface ablation of the cortical auditory zone, followed by considerable retrograde degeneration of the medial geniculate bodies (except caudal parts) and a complete degeneration of the pulvinar, the posterior thalamic nuclei, and the pretectal zone. Section of

the acoustic radiation under the temporoinsular cortex leads to the disappearance of differentiation of rings of bells, successive complexes of tones, and tones differing in the number of interruptions per minute and in frequency. An approximate scheme is given of the closing of conditioned reflexes to acoustic stimuli, which shows that it is a complex multistage process occurring not only in the cerebral cortex, but also in various parts of the central nervous system.

## A67-82068

**QUANTITATIVE CHANGES IN THE STRUCTURE OF THE VISUAL ANALYZER DUE TO FUNCTIONAL DEAFFERENTATION [KOLICHESTVENNYE IZMENENIYA V STRUKTURE ERITEL'NOGO ANALIZATORA PRI FUNKSIONAL'NOI DE-AFFERENTATSII].**

F. A. Brazovskaia (USSR Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Lab. of Central Nervous System Morphol., Moscow).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, May-Jun. 1967, p. 548-552. 23 refs. In Russian.

A study was made of the effect of light and dark adaptation on neuronal activity of the central parts of the visual analyzer: the dorsal nucleus of the lateral geniculate body and the afferent layer of field 17. The level of the neuronal activity was estimated by shifts in the tissue elements. In both structures the amount of perineuronal and pericapillary glia and the density on the capillary network is less in the group of animals kept in the dark. A different intensity of changes is found at the cortical and subcortical levels of the analyzer. However, within one level, shifts of a corresponding magnitude were found in all the three components. The data point to the existence of a single combined functional system: neuron-glia-capillary network, with a probable metabolic differentiation within it. A conclusion was drawn that in the absence of specific visual stimulation, non-visual signals reaching the central parts of the analyzer cannot completely provide for the required level of activity of the above system.

## A67-82069

**THE ESTIMATION OF THE FUNCTIONAL STATE OF THE CEREBRAL CORTEX BY EEG DATA [K VOPROSU OTSENKI FUNKSIONAL'NOGO SOSTOYANIYA KORY GOLOVNOGO MOZGA PO DANNYM ELEKTROENTSEFALOGRAFII].**

A. N. Bukharin and T. P. Akimova.

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, May-Jun. 1967, p. 539-547. 20 refs. In Russian.

A method was suggested for estimating the functional state of the cerebral cortex by the data of the electroencephalogram (EEG) quantitative analysis obtained by means of the electroencephalographic complex of "Biophyspribor." An analyzer with band filters (the Kozhevnikov principle) and an integrator included in the complex permit to determine the mass bioelectrical EEG activity and the intensity of each of the rhythms. The mass bioelectrical EEG activity for the time period under investigation is assumed to be 100%, while the intensity of each of the rhythms is estimated as a percentage of the mass activity. It is proposed to judge of the level of the excitatory process in the cerebral cortex by the intensity of the sum of fast rhythms (beta+gamma) and of the level of the inhibitory process by the intensity of the sum of slow rhythms (delta+theta). The difference between the intensity of the sum of fast and that of slow rhythms is used for the quantitative characteristics of the relationship between the basic cortical processes. The average intensities are given of each rhythm in the frontal, temporal and occipital regions.

## A67-82070

**CYCLES OF EXCITABILITY OF VISUAL CORTICAL NEURONS IN THE ALERT RABBIT IN RESPONSE TO DOUBLE FLASHES** [TSIKLY VOSSTANOVLENIYA NEIRO-NOV ZRITEL'NOI KORY BODRSTVUIUSHCHEGO KRÖLIKA NA DVOINYE VSPYSHKI SVETA].

V. B. Polianskii (M. V. Lomonosov Moscow State U., Dept. of Physiol. of Higher Nervous Activity, USSR).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, Jul.-Aug. 1967, p. 714-721. 24 refs. In Russian.

Averaged histograms of excitability cycles of 40 visual cortical units were analyzed in the alert rabbit. The following phases of the cycle were revealed by means of special diagram: absence of responses (40 to 80 msec.), reduced excitability (80 to 130 msec.), enhanced excitability (130 to 200 msec.), and restoration of response to the normal (200 to 250 msec.). It is assumed that the excitability cycles are based, in the main, on recurrent inhibition achieved by inhibitory interneurons. The phase of enhanced excitability may be due to postanode exaltation or the activity of excitatory interneurons. The excitability cycles of different units vary, which may contribute to a more rapid discrimination of photic signals in the visual analyzer.

## A67-82071

**EVOKED RESPONSE OF THE RETICULAR FORMATION AND THE VISUAL CORTEX IN RABBITS WITH ENHANCED EXCITABILITY OF THE MIDBRAIN RETICULAR FORMATION** [VYZVANNYE OTVET V RETIKULIARNOI FORMATSII I ZRITEL'NOI KORE PRI POVYSHENNOI VOZBUDIMOSTI V RETIKULIARNOI FORMATSII SREDNEGO MOZGA].

M. A. Riabinina (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, Jul.-Aug. 1967, p. 697-704. 15 refs. In Russian.

Injection of strychnine into the ventrolateral part of the midbrain reticular formation of the rabbit led to a change in evoked potentials. It was manifested in an enhancement of the negative component and the subsequent secondary positive oscillation. Such an enhancement combined with motor responses of the rabbit was considered as an electrographic expression of the dominant state. The evoked responses in the visual cortex after the injection of strychnine into the reticular formation underwent definite changes: (a) the positive component of the primary response remained without any visible changes or diminished; (b) its negative component and the secondary positive oscillation markedly increased. Motor responses to photic stimuli were accompanied by depression of cortical evoked potentials. With higher frequency of photic flashes, the drop in the amplitude of evoked responses was more rapid.

## A67-82072

**EEG AND THE STEADY POTENTIAL [ELEKTROENTSEFALOGRAMMA I POSTOIANNYI POTENTIAL].**

R. A. Pavlygina (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, Jul.-Aug. 1967, p. 689-696. 33 refs. In Russian.

In a chronic experiment on rabbits, the electroencephalogram (EEG) frequency spectrum was recorded at different steady potential levels (SPL). Correlation between SPL and the EEG frequency spectrum was observed during its natural long oscillations (in the postoperational period) and when changed by polarization (4 to 10 uA., 15 min.). At a level above 8 to 10 mv., delta-waves prevailed in EEG, and the respiratory rhythms were particularly pronounced. At a level of 2 to 6 mv. there appeared a synchronized rhythm—5 to 6 per sec., spindles 8 to 12 per sec., and slow one

sec. waves. If SPL was below 2 mv., the EEG frequency spectrum was diverse and adjacent points differed in their electrical activity. Such a correlation between SPL and EEG spectrum was observed only during their long-lasting changes. A momentary change in the frequency spectrum of fast potentials (in response to light and sound) was most frequently not accompanied by a SPL change. This apparently attests that slow and fast potentials are generated by structures with different lability, and that these processes are not always interdependent.

## A67-82073

**EFFECT OF NEUROLEPTICS ON THE BEHAVIORAL AND ELECTROENCEPHALOGRAPHIC REACTIONS TO STIMULATION OF THE LIMBIC STRUCTURES OF THE BRAIN** [VLIANIE NEIROLEPTIKOV NA POVEDENCHESKIE I ELEKTROGRAFICHESKIE REAKTSII, VYZVANNYE RAZDRAZHENIEM LIMBICHESKIKH STRUKTUR MOZGA].

L. Kh. Allikmets and F. P. Vediaev (USSR, Acad. of Med. Sci., Inst. of Exptl. Med., Lab. of Comp. Physiol. and Tartu U., Central Med. Sci.-Res. Lab., Leningrad).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, Jul.-Aug. 1967, p. 659-668. 30 refs. In Russian.

In chronic experiments on twelve rabbits, an investigation was made into the influence of neuroleptics (chlorpromazine, promazine, stelazine and galoperidol) on the behavioral and electroencephalographic reactions to the stimulation of limbic structures and the medial thalamic nuclei. All kinds of behavior activation (alertness reaction, orienting-investigating, and aggressive defensive reactions) induced by the stimulation of nonspecific thalamic nuclei were most intensively depressed by chlorpromazine, then by promazine, stelazine and galoperidol. The same sequence of effectiveness was recorded in the case of stimulation of the hippocampus and the septum. The least effective were the neuroleptics with regard to the aggressive defensive reaction induced by stimulation of the amygdala complex. Galoperidol was the least effective of all. All the neuroleptics of the phenothiazine series (chlorpromazine, promazine and stelazine) intensified the convulsive activity in the limbic structures; the duration of the after-discharges particularly increased, and their thresholds especially decreased in the amygdala complex and the ventral part of the hippocampus. Analysis is made of the mechanisms of changes in behavioral reactions under the influence of neuroleptics and the possible localization of their action.

## A67-82074

**DYNAMICS OF EVOKED POTENTIALS PARAMETERS DURING FORMATION OF A DIFFERENTIATION [O DINAMIKE PARAMETROV VYZVANNYKH POTENTIALOV PRI FORMIROVANII PROTSESSA DIFFERENTSIROVANIYA].**

T. S. Naumova and N. S. Popova (USSR Acad. of Med. Sci., Inst. of Brain, Moscow).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, Jul.-Aug. 1967, p. 650-658. 15 refs. In Russian.

A study was made of latency, duration, and amplitudes of the three first components of evoked potentials in the auditory and visual cortical projection areas during the formation of a differentiation to a stimulus differing from the positive one by the frequency of interruptions. The dynamics of these parameters passes through the same stages as during the formation of a positive defensive reflex. At the beginning of differentiation formation, the amplitude, duration, and latency of evoked potentials to the first and subsequent clicks or flashes diminish. Then the magnitude and duration of the responses increase, and their latency remains short. The subsequent decrease in the amplitude of evoked potentials, which precedes their disappearance from the cortical end of the analyzer, is accompanied by a longer latency and duration. At the stage of stabilized differentiation, evoked potentials

## A67-82075

disappear successively to the third, second, and first clicks. The data obtained point to increased excitability of the signal analyzer at the initial moment of the action of the negative stimulus. But in the course of action of the differentiation stimulus, the excitability of the signal analyzer decreases to the initial background level.

## A67-82075

**INFLUENCE OF CHANGES IN THE FUNCTIONAL STATE OF THE CORTEX AND THE BRAIN STEM ACTIVATING SYSTEM ON DETECTION OF WEAK ACOUSTIC SIGNALS [VLIIANIE IZMENENII FUNKSIONAL'NOGO SOSTOIANIIA KORY I AKTIVIRUIUSHCHEI SISTEMY STVOLA MOZGA NA OBNARUZHENIE SLABYKH ZVUKOVYKH SIGNALOV].**

E. A. Kostandov (V. P. Serbskii Central Sci.-Res. Inst. of Forensic Psychiat., Moscow, USSR).

*Zhurnal Vyshei Nervnoi Deiatel'nosti*, vol. 17, Jul.-Aug. 1967, p. 634-642. 14 refs. In Russian.

Polygraphic records of components of the orienting reflex (OR) electroculogram, galvanic skin response, respiration, (electrocardiogram, plethysmogram), as well as of the electrooculogram, of conditioned fist clenching have shown that repeated application of short weak sounds (white noise, one msec. and more) brings about along with improved signal detection a drop of OR threshold to subsensory stimuli. A similar improvement of signal discrimination from weak background noises was observed during tonic arousal evoked by photic stimulation. Administration of drugs enhancing activation of adrenergic and cholinergic elements of the reticular formation (phenatine, galantamine) the discrimination of the stimulus at the level of the second signal system was appreciably worsened. At the same time signal detection by means of OR improved, which was manifest in the lowering of OR thresholds to subsensory stimuli. On the other hand, caffeine, a drug which directly enhances the excitability of cortical neurons, clearly improved the detection of short stimuli but did not affect OR thresholds to subsensory stimuli. The facts indicate that detection of a useful signal from noises may proceed at different functional levels independently of each other.

## A67-82076

**TIME JUDGMENT AND BODY TEMPERATURE.**

R. H. Fox, Pamela A. Bradbury, and I. F. G. Hampton (Cambridge U., Psychol. Lab., Great Britain).

*Journal of Experimental Psychology*, vol. 75, Sep. 1967, p. 88-96. 22 refs.

The effects of raising body temperature on subjects time judgments were investigated in two experiments. Experiment I: eight subjects performed five tasks (production of 1, 10, and 30 sec. and tapping at 1 and 3 taps./sec.) at three body temperatures (normal, 38.0° and 39.0° C.). These results were inconclusive. Experiment II: twelve subjects judged ten sec. by production at five body temperatures (normal, 37.5°, 38.0°, 38.5°, and 39.0° C.) in the same session and during exposure to a cold stress. Despite large individual variations, group mean-time judgments shortened (i.e., the internal clock speeded up) as body temperature increased. Cold stress produced similar but smaller effects. This and previous studies seem consistent with the hypothesis that time judgment is a learned skill in which some function of cerebral neural activity acts as a time base.

## A67-82077

**EAR PREFERENCE IN A SIMPLE REACTION-TIME TASK.**

J. Richard Simon.

*Journal of Experimental Psychology*, vol. 75, Sep. 1967, p. 49-55. 27 refs.

This paper reports three experiments concerned with the effects of ear(s) stimulated, responding member, handedness, and age on simple auditory reaction time (RT). A 1,000-c.p.s. stimulus tone was presented to either the left ear, the right ear, or both ears simultaneously. The subjects responded to the tone onset by depressing a finger key. Right- and left-hand blocks of trials were used. In Experiments I and II, subjects did not know prior to a trial which ear(s) would be stimulated. Under these conditions, they responded faster to right-ear stimulation than to left and, with the exception of an older group, were faster on binaural trials than on monaural trials. When subjects were informed in advance as to which ear would be stimulated (Experiment III), the differences previously noted were no longer apparent.

## A67-82078

**SERUM ENZYME PATTERNS IN HIGHLY EFFICIENT ATHLETES AND THEIR CHANGES UNDER EXHAUSTIVE PHYSICAL STRAIN [DAS SERUMENZYMMUSTER DES HOCHLEISTUNGSSPORTLERS UND SEINE VERÄNDERUNGEN UNTER ERSCHÖPFENDER KÖRPERLICHER BELASTUNG].**

G. Ahlert, S. Platzek, H. Wuschech, and M. Rattay.

*Das Deutsche Gesundheitswesen*, vol. 22, Jun. 1, 1967, p. 1042-1046. 27 refs. In German.

Highly efficient athletes were subjected to a physical strain test. Depending on the exhaustive physical strain, the activities of lactate dehydrogenase (LDH), glutamate-oxal acetate-transaminase (GOT), aldolase and sorbite dehydrogenase (SDH), were examined in the serum. Following a short exhaustive strain, no significant changes of the above enzyme activities were detected except for a slight increase of LDH. An exhaustive perseverance test resulted in the significant rise of the activities of LDH, GOT and aldolase in the serum. The activities of GPT and SHD remained unchanged. Thirty min. after the strain was over, the values could not be distinguished from the rest-position values. The pathophysiological importance of these findings was discussed.

## A67-82079

**INDEPENDENT VARIATION OF INFORMATION STORAGE AND RETRIEVAL PROCESSES IN PAIRED-ASSOCIATE LEARNING.**

W. K. Estes and Frank Da Polito (Stanford U., Palo Alto, Calif.) (*Midwestern Psychol. Assn., Meeting, Chicago, May 1967*).

*Journal of Experimental Psychology*, vol. 75, Sep. 1967, p. 18-26. 8 refs.

Contract Nonr-225(73).

Paired-associate items were presented to subjects under either intentional or incidental training procedures, then tested under either recognition or recall conditions. Recognition scores indicated very little difference in amount learned following incidental as compared to intentional training conditions. Initial recall tests revealed large decrements in performance following incidental training, supporting the assumption that recall performance involves a retrieval process which can be modified independently of the information storage required for recognition performance. Data for shifts from recall to recognition or the reverse over a sequence of unreinforced tests indicated that learning occurring on test trials may be facilitatory or detrimental to correct responding depending upon particular conditions.

## A67-82080

**SOME EXPERIMENTS ON SIMPLE AND CHOICE REACTION TIME.**

Joan Gay Snodgrass (N.Y.U., New York City), R. Duncan Luce (Pa. U., Philadelphia), and Eugene Galanter (Wash. U., Seattle). *Psychonomic Soc., 5th Sci. Meeting, Niagara Falls, Canada, Oct. 1964*.

*Journal of Experimental Psychology*, vol. 75, Sep. 1967, p. 1-17. 21 refs.

Contract Nonr 477(34), Grants NSF GB 1462, and NIH FR-15.

Four experiments in simple and choice reaction time (RT) are reported. Experiment I examines the effect of monetary payoffs on the accuracy and variability of time estimation. Experiment II examines the effect of moving the position of a narrow payoff band along the time axis on the variability of observed RTs. This appears to alter the proportion of bona fide reactions (of low variability) and of more variable time estimates of the foreperiod duration. Experiment III is designed to assess the factors responsible for the increased mean and variability of choice compared with simple RT distributions. It is concluded that information processing rather than motor factors is primarily responsible for the difference between simple and choice RT. Experiment IV studies the relation between RT of correct and error responses as a function of variations in stimulus probability in a two-choice RT paradigm. Finally, several theoretical distributions are evaluated by the empirical distributions obtained in Experiments II, III, and IV; none seems wholly satisfactory, but those with rounded modes and an exponential tail (e.g., the gamma) are clearly not adequate.

#### A67-82081

**ON THE INFLUENCE OF DIFFERENT PROBABILITY OF A SIGNAL OF HIGHER NERVOUS ACTIVITY OF A HUMAN OPERATOR [O VLIANII RAZLICHNOI VEROIATNOSTI SIGNALA NA VYSSHUIU NERVNUIU DEIATEL'NOST' CHELOVEKA-OPERATORA].**

A. M. Zingerman (USSR, Acad. of Med. Sci., Inst. of Exptl. Med., Lab. of Comp. Physiol. and Pathol., Leningrad).

*Zhurnal Vysheii Nervnoi Deiatel'nosti*, vol. 17, May-Jun. 1967, p. 400-407. 37 refs. In Russian.

The work of a man operator at a model control board was studied. Records were made of the respiratory, cardiovascular, skin-galvanic reactions, and of latencies of motor responses to signals occurring at random sequence with probabilities of 1, 3/4, 1/2, 1/4 and 1/8. Reinforcement was made by a painful electric cutaneous stimulation in cases of delayed responses. With the signal probability decrease from 1 to 1/4, enhanced manifestation of vegetative reactions and shorter time of the motor reaction were observed. With a signal probability equalling 1/8, a diminished manifestation of vegetative reactions and a longer time of motor reaction were recorded.

#### A67-82082

**INFLUENCE EXERTED ON THE BIOELECTRIC ACTIVITY OF THE BRAIN BY AMIZYL (BENACTYZINE), APROPHEIN (DIPHEN) AND CORRESPONDING TO THEM QUINUCLIDINE ETHERS [VLIANIE NA BIOELEKTRICHESKUIU AKTIVNOST' GOLOVNOGO MOZGA AMIZILA, APROFENA I SOOTVETSTVUIUSHCHIKH IM EFIROV KHINUCLIDINA].**

M. D. Mashkovskii and L. F. Roshchina.

*Farmakologiya i Toksikologiya*, vol. 30, Jul.-Aug. 1967, p. 415-419. 15 refs. In Russian.

This paper sets forth a comparative investigation of the effect produced on the bioelectric activity of the brain cortex and hippocampus in cats and rabbits by benactyzine and aprophen (2-diethylaminoethanol diphenylpropionate hydrochloride) and by corresponding to them quinuclidine ethers: 3-oxyquinuclidine benzylate and aprolidin (3-oxyquinuclidine diphenylpropionate hydrochloride). The most active among these proved benactyzine

and 3-oxyquinuclidine benzylate, with aprolidin and aprophen coming next. The most prolonged action is displayed by 3-oxyquinuclidine benzylate and aprolidin with benactyzine and aprophen following them.

#### A67-82083

**THERMOREGULATORY ACTION OF CHLOROPROMAZINE AT HIGH AND LOW TEMPERATURES [VLIANIE AMINAZINA NA TERMOREGULIATSIIU V USLOVIAKH VYSOKIKH I NIZKIKH TEMPERATUR].**

I. P. Shcherbachev (S. M. Kirov Mil.-Med. Acad., Dept. of Aviation Med., Leningrad, USSR).

*Farmakologiya i Toksikologiya*, vol. 30, Jul.-Aug. 1967, p. 407-409. In Russian.

The influence of chlorpromazine (in an amount of 5 mg./kg.) of body weight) on the resistance to low (-25 to -50°C.) and high (+45, +75 and +100°C.) temperatures of the surrounding medium was studied on albino mice. The drug tended to lower the resistance of the animals to both low and high atmospheric temperature.

#### A67-82084

**NICOTINE ACTION ON REFLEX REACTIONS AND ACTIVITY OF INDIVIDUAL SPINAL CORD NEURONS [O VLIANII NIKOTINA NA REFLEKTORNYE REAKTSII I AKTIVNOST' OTDEL'NYKH NEIRONOV SPINNOGO MOZGA].**

IU. D. Ignatov (I. P. Pavlov First Leningrad Med. Inst., Dept. of Pharmacol., USSR).

*Farmakologiya i Toksikologiya*, vol. 30, Jul.-Aug. 1967, p. 402-405. 6 refs. In Russian.

In experiments on spinal, curare-treated frogs, nicotine, when given in a dose of 12 γ/gm., intensified reflex reactions, increased the frequency of neuron discharges, enhanced the relief and reduced the inhibitory effect of afferent stimulations. In larger doses (30 γ/gm.) nicotine depressed reflex reactions, reduced the frequency of neuron discharges and relief, as well as inhibitory effects of afferent stimulants.

#### A67-82085

**ELECTROENCEPHALOGRAPHIC CHANGES UNDER THE INFLUENCE OF CHLOROPROMAZINE [IZMENENIIE ELEKTROENTSEFALOGRAMMY POD VLIANIEM AMINAZINA].**

S. I. Subbotnik, V. V. Vasil'eva, and P. I. Shpil'berg (N. I. Pirogov Second Moscow Med. Inst. and F. F. Erisman Moscow Sci.-Res. Inst., USSR).

*Farmakologiya i Toksikologiya*, vol. 30, Jul.-Aug. 1967, p. 396-400. 6 refs. In Russian.

Investigations on rabbits and persons suffering from various neuropsychic disorders demonstrated that chlorpromazine exercises a synchronizing influence on the electroencephalogram. The duration of the desynchronization reaction was shortened speeding up the development of adaptation to optic and acoustic stimulants.

#### A67-82086

**INFLUENCE OF PIPOLPHEN AND HYPOTONIC MANNITE SOLUTION ON OSMOTIC ERYTHROCYTE RESISTANCE IN MAN AND ANIMALS ADAPTED TO HYPOXIA [VLIANIE PIPOL'FENA I GIPOTONICHESKIKH RASTVOROV MANNITA NA OSMOTICHESKUIU REZISTENTNOST' ERITROTSITOV LIUDEI I ZHIVOTNYKH, ADAPTIROVANNYKH K GIPOKSII].**

Z. I. Barbashova and M. I. Aginova (USSR, Acad. of Sci., I. M. Sechenov Inst. of Evolutionary Physiol. and Biochem., and Kirghiz SSR, Acad. of Sci., Inst. of Reg. Med., Frunze).

*Fiziologicheskii Zhurnal SSSR*, vol. 53, Jul. 1967, p. 809-814. 10 refs. In Russian.

In man and white mice the erythrocyte hemolysis curves in hypotonic solutions of mannite remain without change even when the erythrocyte resistance in iso-osmotic mannite solutions of sodium chloride or potassium chloride proves to be significantly changed. One may assume that the permeability of erythrocyte sheath to water remains unchanged during training to hypoxia, the shifts of osmotic cell resistance being associated to permeability changes to electrolytes. Erythrocytes previously treated by pipolphen differ from the intact cells in their significantly increased hemolysis given equal sodium chloride concentrations in the medium. Pipolphen effect results as well in erythrocytes losing their osmotic stability properties acquired following hypoxic hypoxia. These data confirm the assumption that the change in the osmotic erythrocyte resistance is associated with a disturbance permeability of the cell sheath to electrolytes.

## A67-82087

**FREQUENCY LOCALIZATION IN AUDITORY CORTEX IN CATS UNDER DEEP ANESTHESIA AND LOCAL STRYCHNINE APPLICATION TO THE CORTEX [LOKALIZATSIIA CHASTOT V SLUKHOVOI ZONE KORY KOSHKI V USLOVIAKH GLUBOKOGO NARKOZA I LOKAL'NOI STRIKHNINIZATSII KORY].**

I. I. Kachuro (USSR, Acad. of Sci., I. P. Pavlov Inst. of Physiol., Lab. of Acoustic Analyzer Physiol., Leningrad). *Fiziologicheskii Zhurnal SSSR*, vol. 53, Jul. 1967, p. 769-776. 15 refs. In Russian.

Local strychnine application to the cortex resulted in appearance of strychnine spikes in response to afferent stimulation. These spikes differ from primary responses by having: a 3-phase form, a significantly larger amplitude (up to 1-2 m.v.), longer lasting phases and in many cases a longer latent period. The threshold of strychnine evoked spikes was, as a rule, higher than that of the primary response. By gradually lowering the sound stimuli intensity one may differentiate the strychnine spike from the primary response in the cortex point subjected to strychnine application. The preliminary response parameters recorded following strychnine application do not significantly differ from those of the primary response recorded in the corresponding points of the acoustic zone prior to strychnine application.

## A67-82088

**EXTRA- AND INTRACELLULAR INVESTIGATION OF NEURON RESPONSES IN THE MOTOR CORTEX OF ALERT RABBITS TO ACOUSTIC AND PHOTIC STIMULI [VNE I VNUTRIKLETOCHNOE ISSLEDOVANIE OTVETOV NEIRONOV DVIGATEL'NOI ZONY KORY BODRSTVUIUSHCHEGO KROLIKA NA ZVUKOVYE I SVETOVYE STIMULY].**

L. L. Voronin and V. G. Skrebetskii (USSR, Acad. of Med. Sci., Inst. of Brain, Moscow). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, May-Jun. 1967, p. 523-533. 52 refs. In Russian.

Among the 200 units of the motor cortex of an alert rabbit, whose activity was investigated by means of extracellular microelectrodes, 113 reacted at least to one of the "non-specific" stimuli (flashes, clicks, tones). The responses are characterized by long (dozens and hundreds of millisec.) and variable latencies and after-discharges. About 10% of the responses are of the inhibitory nature. A quarter of the cells exhibits a tendency to react approximately to one and the same set of stimuli in one track. Among poorly active units (spontaneous activity less than 0.3 imp./sec.), the percentage of cells responding to "non-specific" stimuli is half that of the other cells. By the nature of changes of responses in time, three groups of units have been classified, whose response: (a) did not change appreciably or changed

without any marked regularity; (b) became extinct in the course of repetition; and (c) appeared or improved, following the presentation of stimuli of one or several kinds. By means of intracellular electrodes, only subthreshold evoked potentials were revealed in some units in response to "non-specific" stimuli. The recorded postsynaptic potentials appear with long and varying latencies, often have a sloping front and may have appearance of an increased background "synaptic noise".

## A67-82089

**THE ACTION OF BROMINE AND CAFFEINE MIXTURE ON HIGHER NERVOUS ACTIVITY OF CATS AND THE EXCITABILITY OF THE MOTOR ANALYZER [DEISTVIE SMESI BROMA S KOFEINOM NA VYSSHUIU NERVNUIU DEIATEL'NOST' KOSHEK I VOZBUDIMOST' KORKOVOGO PUNKTA DVIGATEL'NOGO ANALIZATORA].**

A. I. Gontar' (Rostov-on-the-Don State Med. Inst., Dept. of Pharmacol., USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, May-Jun. 1967, p. 489-496. 20 refs. In Russian.

Various doses of bromine (0.3-200 mg./kg.) and caffeine (0.03-23 mg./kg.) in different combinations were tested in cats with motor defensive conditioned reflexes, positive and negative, and with electrodes chronically implanted in the motor analyzer area. The action of the bromine and caffeine mixture was of short duration and changeable. Absolutely chaotic higher nervous activity was controlled only in one case out of seven up to a distinct manifestation of conditioned reflexes stereotype for a long time. In the rest of the animals, there was either no positive effect or it was very unstable. In cases of positive action of the mixture on conditioned activity, the dynamics of the cortical excitability also improved; the level of background excitability did not, in the main, change. Only combinations containing a large dose of bromine (200 mg./kg.) raised the thresholds of excitation, particularly after the action of inhibitory signals.

## A67-82090

**THE ROLE OF THALAMIC FORMATIONS (MEDIAL GENICULATE BODY) IN CLOSING CONDITIONED REFLEXES [O ROLI TALAMICHESKIKH OBRAZOVANII, V CHASTNOSTI VNUTRENNEGO KOLENCHATOGO TELA, V ZAMYKANII USLOVNYKH REFLEKSOV].**

T. A. Mering (USSR, Acad. of Med. Sci., Inst. of Brain, Moscow). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, May-Jun. 1967, p. 464-469. 13 refs. In Russian.

This study was carried out using the complex morphophysiological method. In a group of dogs, elaboration of numerous positive and negative conditioned reflexes to single and complex acoustic stimuli was followed by a bilateral ablation of the medial geniculate bodies. In another group the elaboration of reflexes was preceded by the ablation of the medial geniculate bodies. Then the dogs were sacrificed and a complete serial control of the brain was performed by the methods of Niessl and Spielmeyer. A number of data oppose the conception that the medial geniculate body plays the part of a reflex center. Thus, it is considered that ablation had no appreciable influence on the closing of conditioned connections. A decrease in the cortical tone was only noticed during the first month, and subsequently, some weakening of differentiation inhibition. Specific thalamic and metathalamic nuclei play the role, so to speak, of a lens and diaphragm, joining the corresponding cortical projection areas into a functionally single formation.

## A67-82091

**FUNCTIONAL ORGANIZATION OF CONDITIONED EXCITATION EVOKED BY A SHORT CONDITIONED STIMULATION [FUNKTSIONAL'NAIA ORGANIZATSIYA USLOVNOGO VOZBUZHDENIIA PRI KOROTKOM PRIMENENII USLOVNOGO RAZDRAZHITELIA].**

S. P. Pyshina (I. P. Pavlov First Leningrad Med. Inst., Dept. of Normal Physiol., USSR).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, May-Jun. 1967, p. 459-463. 7 refs. In Russian.

Short auditory stimulations lasting from one to two sec. and followed by a pause up to 29 to 28 sec. before reinforcement were applied to dogs with stable salivary and motor conditioned reflexes delayed by 30 sec. At the first presentations of the short stimulus, secretion was observed only at the beginning of the pause; in the subsequent trials—at the beginning and end of the pause, and then it was distributed throughout the pause, increasing towards the moment of reinforcement. The magnitude of the conditioned reflex does not reach the level of that evoked by a 30-sec. stimulation.

## A67-82092

**ANALYSIS OF FUNCTIONAL ORGANIZATION OF AVOIDANCE REACTIONS [ANALIZ FUNKTSIONAL'NOI ORGANIZATSII USLOVNYKH REFLEKSOV IZBEGANIYA].**

R. L. Gasanova (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Lab. of Conditioned Reflexes, Moscow). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, May-Jun. 1967, p. 451-458. 18 refs. In Russian.

An investigation was made of the functional structure of temporary connections in avoidance reactions in dogs, namely, lifting the left foreleg, up to a definite height, first elicited by electrical stimulation of the right hindleg, and then to a distant conditioned stimulus. Four experimental series with extinction of the reaction were carried out: (1) with elimination of electrical stimulation; (2) in the course of eliciting a similar reaction of the other leg; (3) extinction with reinforcement when the elicited movement did not relieve the dog of the current; and (4) extinction of avoidance reaction of the foreleg, induced by direct electrical stimulation of the hindleg. The functional state of the conditioned arc links was tested by another signal stimulus not extinct in the given series. In the first two series, the test stimulus evoked the avoidance reaction, in the third, it evoked the newly elicited movement and in the fourth, it did not evoke the defensive response. Analysis of the facts and changes in the stimulation threshold showed that in the course of avoidance reaction elaboration, the signal analyzer becomes functionally linked to the motor one predominantly through that part of the cutaneous analyzer to which the nociceptive stimulation is addressed.

## A67-82093

**CHANGES OF EVOKED POTENTIALS DURATION IN THE COURSE OF DEFENSIVE CONDITIONING IN DOGS [IZMENENIYA DLITEL'NOSTI VYZVANNYKH POTENTIALOV V PROTSESSE FORMIROVANIYA OBORONITEL'NYKH USLOVNYKH REFLEKSOV U SOBAK].**

T. S. Naumova and N. S. Popova (USSR, Acad. of Med. Sci., Inst. of Brain, Moscow).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, May-Jun. 1967, p. 442-450. 23 refs. In Russian.

Analysis of the first three components of evoked potentials (EP) in the auditory and visual cortical projection zones in the course of defensive conditioning to intermittent acoustic and photic stimuli (two per second) showed that changes in their duration can be classified into five stages. The stages are more or less

pronounced depending on the modality of the stimulus and on the individual typological peculiarities of the dogs. Elaboration of differentiation results in a momentary shortening of the duration and the latency of EP to the positive stimulus. Regular changes in the EP duration latency and amplitude occur in response to each flash or click from the series serving as a conditioned signal. They are, however, most pronounced in response to the first stimulus in the series. At all the stages of defensive conditioning there are a shortened duration and latency of the EP by the moment of the conditioned response. But when the reflex is stabilized then sometimes the EP duration and latency are likely to increase by the moment of effector response. The data obtained are considered with relation to changes in excitability, lability, as well as changes in the level of excitation of the signal analyzer, which vary in the course of conditioning.

## A67-82094

**CHANGES IN THE CONDITIONED REFLEX TO TIME AFTER SCHOOL IN CHILDREN OF A DIFFERENT AGE [OB IZMENENII USLOVNOGO REFLEKSA NA VREMIA POSLE UCHEBNOGO DNIA U DETEI RAZLICHNOGO SHKOL'NOGO VOZRASTA].**

A. S. Dmitriev and T. V. Tushnova (Bashkir State U., Dept. of Human and Animal Physiol., Ufa, USSR).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, May-Jun. 1967, p. 413-418. 7 refs. In Russian.

The reproduction of a fifteen-sec. interval was studied before and after school in children of different ages (from seven to sixteen years). After school accuracy of reproducing the interval diminished (especially at the end of the week and in children aged from seven to nine years). The nature of the conditioned reflex to time likewise changed, depending on the state of the nervous system before school, whereas before school the reproduced interval was prolonged. After school, as a rule, it became shorter. If, however, there was a slight shortening of the interval before school, it became longer after school, and if the initial shortening was considerable, it was further shortened after school, too. The above facts are explained by changes in the balance of nervous processes in the case of fatigue and on the assumption that lengthening of the reproduced interval is connected with the predominance of excitation, and its shortening, with the prevalence of inhibition.

## A67-82095

**VEGETATIVE SHIFTS INDUCED IN MAN BY EMOTIONAL STRESS [TIPY VEGETATIVNYKH SDVIGOV U CHELOVEKA PRI EMOTSIONAL'NOM NAPRIAZHENII].**

L. P. Grimak and V. A. Ponomarenko.

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, May-Jun. 1967, p. 408-412. 10 refs. In Russian.

A study was made of reactions of the cardiovascular and respiratory systems in the course of activity attended with negative emotions in beginner parachutists and in pilots when the aircraft automatic control failed to operate. The psychophysiological reactions in parachutists were studied by the method of reproduction of emotional states in hypnosis, and in pilots, under conditions of actual flying experiment. Two types of physiological reactions of the cardiovascular and respiratory systems to stress situations were revealed, which were termed: hypernormo- and hypotonic. The two types are related to the types of higher nervous activity of the subjects and their preparedness for that kind of activity.

## A67-82096

**TOUCH, HEAT AND PAIN.**

Edited by A. V. S. de Reuck and Julie Knight. London, J. and A. Churchill Ltd., 1966, xiii+389 p. Many refs. \$9.17

The proceedings of the second Ciba Foundation symposium is presented in a short series on the general theme of sensory function. Included were: (1) transfer functions of the skin and muscle senses; (2) structure of receptor organs; (3) basic mechanisms, biophysics of supporting tissues and receptors; (4) relation of single receptor activity to parameters of stimuli; and (5) relation of activity of populations of receptors to parameters of stimuli.

## A67-82097

**CHANGES IN HIGHER NERVOUS ACTIVITY OF RHESUS MONKEYS INDUCED BY A TOTAL GAMMA-IRRADIATION [IZMENENIYA VYSSHEI NERVNOI DEIATEL'NOSTI MAKAKOV REZUSOV POSLE OBSHCHEGO GAMMA-OBLUCHENIYA].**

V. A. Khasabova (USSR, Acad. of Med. Sci., Inst. of Exptl. Pathol. and Therapy, Lab. of Physiol. and Pathol. of Higher Nervous Activity, Sukhumi).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, Jul.-Aug. 1967, p. 730-738. 9 refs. In Russian.

A study was made on seven adult *Macaca mulatta* of the effect of a single total gamma-irradiation in 400, 100 and 60 r doses on motor food conditioned reflexes. A 400 r dose induced phasic changes of conditioned activity. The first phase, of primary disturbances in conditioned activity, does not depend on hematological changes and lasts from one to four days. The second phase, of relative normalization and stabilization of conditioned reflexes, proceeds against the background of a progressively developing irradiation disease and lasts from 11 to 18 days. The third phase, of secondary changes in conditioned reflexes, lasting from seven to sixteen days, continues even after the normalization of the blood (when the animals survive). A single total gamma-irradiation of 100 and 60 r doses results in a disturbance of conditioned activity which lasts about two weeks.

## A67-82098

**INFLUENCE OF A CONSTANT MAGNETIC FIELD ON THE BIOELECTRICAL ACTIVITY OF DIFFERENT FORMATIONS OF THE RABBIT BRAIN [O VLIYANII POSTOIANNOGO MAGNITNOGO POLIA NA BIOELEKTRICHESKUIU AKTIVNOST' RAZLICHNYKH OBRAZOVANII GOLOVNOGO MOZGA KROLIKA].**

S. N. Luk'ianova (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, Jul.-Aug. 1967, p. 722-729. 20 refs. In Russian.

Experiments on rabbits with chronically implanted electrodes have shown that the summary bioelectrical activity of the cortex and of a number of subcortical formations (the hippocampus, the hypothalamus, specific and non-specific formations of the thalamus, and the mid-brain reticular formation) of the rabbit brain changes under the action of a constant magnetic field of 460 oersted. Statistically significant changes of bioelectrical activity observed in 66% of cases were manifested in an increased number of spindles, slow or pointed waves during the action of the magnetic field. The reaction had a high latency (about 5 sec.) and persisted for a long time after switching off the electromagnet (over 3 min.). The most intensive changes of bioelectrical activity were recorded in the hypothalamus and the cortex, and the least intensive in the mid-brain reticular formation. Injection of caffeine and adrenaline enhanced the reactions to the constant magnetic field, while nembutal and chlorpromazine weakened them.

## A67-82099

**EFFECT OF ACUTE EXERCISE ON CEREBRAL BLOOD FLOW IN MAN.**

M. Russek and J. R. Beaton (Western Ontario U., Dept. of Physiol., London, Canada).

*Proceedings of the Society for Experimental Biology and Medicine*, vol. 125, Jul. 1967, p. 738-741. 12 refs.

DRB, Canada supported research.

Changes in cerebral blood flow (C.B.F.) induced by acute exercise (5 min. of Harvard Step Test at 20/min.) were recorded with the aid of an impedance rheograph in four males and seven females with various degrees of physical training. A substantial increase in the height of the cerebral flow pulses, (males + 27%; females + 49%) and an even larger increase in the integrated recordings, (males + 68%; females + 92%), were observed in all subjects. The increase in C.B.F. lasted for more than five min. after the end of the exercise. A marked increase in heart rate (+42 b./min. for males and +61 b./min. for females) and a small initial decrease in skin temperature followed two min. later by an increase were observed also. Changes in heart rate were highly significant but changes in skin temperature were not. The similarity of these responses to those elicited by hypoxia and the possibility of a participation of the chemoreceptors in the cardiovascular and respiratory reactions observed during exercise were noted.

## A67-82100

**EFFECTS OF EXERCISE ON PLASMA AND TISSUE LEVELS OF LACTATE DEHYDROGENASE AND ISOENZYMES IN RATS.**

Nicholas M. Papadopoulos, Arthur S. Leon, and Colin M. Bloor (Walter Reed Army Med. Center, Walter Reed Army Inst. of Res., Washington, D. C.).

*Proceedings of the Society for Experimental Biology and Medicine*, vol. 125, Jul. 1967, p. 999-1002. 9 refs.

Elevated and variable serum levels of lactic dehydrogenase (LDH) in control rats were found to result from the commonly used method of collecting the blood by cardiac puncture and from the preparation of serum for analysis. Evidence is presented that LDH from heart, red blood cells, and platelets are contributing factors to this discrepancy. When blood was collected from the inferior vena cava and plasma was immediately prepared in plastic tubes for analysis instead of serum, the extraneous factors were largely eliminated. These modifications were employed for the determination of LDH and isoenzymes in untrained rats subjected to four hr. of swimming, and in untrained controls. The data indicated a three-fold increase of LDH activity in the plasma of exercised rats. LDH-isoenzyme determination and histological examination indicated that probable sources in the increased LDH activity were the heart, liver and skeletal muscle.

## A67-82101

**STUDY OF THE GENERALIZING FUNCTION OF A WORD UNDER DIFFERENT FUNCTIONAL CONDITIONS OF THE CEREBRAL CORTEX IN CHILDREN [K VOPROSU OB IZUCHENII OBOBSHCHAISHCHEI FUNKTSII SLOVA PRI RAZNYKH FUNKSIONAL'NYKH SOSTOIANIIAKH KORY GOLOVNOGO MOZGA U DETEI].**

G. E. Kuprits (Vilnius State Pedagogical Inst., USSR).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, Jul. Aug. 1967, p. 627-633. 8 refs. In Russian.

The function of higher forms of generalization was studied by the Koltsova method in 56 school children. Instruction in the broad generalized meaning of a word before the investigations started, accelerated the formation of systems. In the evening, the systems were formed more slowly in a smaller number of children than in the morning, and they were unstable. It proved impossible to form systems without preliminarily instructing the children in the broad generalizing meaning of the word. The data obtained show that the meaning of the word used as a signal depends on the degree of generalization in the given word.

## A67-82102

**ALPHA-RHYTHM PECULIARITIES OF EEG IN MAN FOLLOWING DEAFFERENTIATION OF THE VISUAL AREA (CORRELATION AND FREQUENCY ANALYSIS) [OSOBENOSTI ALFA-RITMA EEG DEAFFERENTIROVANNOI ERITEL' NOI OBLASTI CHELOVEKA (CHASTOTNYI I KORRELIATSION-NYI ANALIZ)].**

O. M. Grindel' and N. S. Kozodoi (USSR, Acad. of Med. Sci., N. N. Burdenko Inst. of Neurosurg., Moscow).

*Fiziologicheskii Zhurnal SSSR*, vol. 53, Jul. 1967, p. 761-768. 25 refs. In Russian.

Electroencephalogram (EEG) frequency analysis of occipital cortex areas in complete homonymous hemianopsia demonstrated statistically significant differences in the average alpha-rhythm amplitude between the "healthy" and injured hemisphere at rest and some changes in alpha-rhythm following photic stimulation with lesser reactions in the deafferented visual cortex. An alpha-rhythm autocorrelation analysis of both occipital areas revealed a well-marked difference in its periodicity in the hemispheres; on the side of the focus the alpha-rhythm periodicity was disturbed and certain arrhythmic fluctuations with an alpha-period were more expressed. An alpha-rhythm cross-correlation analysis of two occipital zones in cases of complete homonymous hemianopsia showed that alpha-activity time relations change differently depending on the condition of the visual cortex itself. In man with hemianopsia the common alpha-rhythm periodicity for the occipital area is disturbed following light stimulations. The "random" component is increased proving the synchronous impulse to have reached the deafferented and the "healthy" visual cortex.

## A67-82103

**ON THE VARIABILITY OF TAXONOMIC CHARACTERS OF UNICELLULAR GREEN ALGAE UNDER THE CONDITIONS OF CULTURE. II. THE DEPENDENCE OF CELL SIZE IN CHLORELLA VULGARIS ON THE TYPE OF NUTRITION [OB IZMENCHIVOSTI SISTEMATICHESKIKH PRIZNAKOV ZELENYKH ODNOKLETOCHNYKH VODOROSLEI V USLOVIYAKH KULTURY. II. ZAVISIMOST' RAZMEROV KLETOK CHLORELLA VULGARIS OT TIPA PITANIYA].**

V. M. Andreeva (USSR, Acad. of Sci., V. L. Komarova Inst. of Botany, Leningrad).

*Botanicheskii Zhurnal*, vol. 52, Jul. 1967, p. 960-966. 19 refs. In Russian.

The dependence of cell size and growth on the type of nutrition was studied in cultures of *Chlorella vulgaris*. It was discovered that in some heterotrophic and micotrophic strains cell size was greater than in autotrophic cultures while this increase was not found in other strains. Thus the appearance of giant cells in *Chlorella* not only depends on cultural conditions such as nutrition but also on the genetic nature of the strain itself.

## A67-82104

**NEGATIVE-POSITIVE PRIMARY RESPONSES OF THE AUDITORY CORTEX IN ANESTHETIZED CATS [NEGATIVNO-POZITIVNYE NERVICHNYE OTVETY SLUKHOVOI KORY NARKOTIZIROVANNYKH KOSHEK].**

O. F. Dembnovetskii (UkrSSR, Acad. of Sci., Inst. of Physiol., Lab. of Electrophysiol., Kiev).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 17, May-Jun. 1967, p. 534-538. 12 refs. In Russian.

An investigation was made into distribution of the potential along the vertical of the cortex during positive-negative and negative-positive primary responses recorded in a monopolar way from the surface of the primary auditory cortex of cats anesthetized with nembutal. At the first phase of the responses, the surface of

the cortex is positive in relation to its various levels, and at the second, it is negative. Thus, the distribution of potentials along the cortex vertical is the same during primary responses of a different form, recorded from the cortex surface in a monopolar way. Such a distribution does not change substantially upon the action of different stimulating sounds.

## A67-82105

**MORPHOLOGICAL AND FUNCTIONAL CONDITIONS OF RAT OVARIES SUBJECTED TO A SINGLE EFFECT OF ACCELERATION [MORFOLOGICHESKOE I FUNKSIONAL'NOE SOSTOYANIE IAICHNIKOV KRYSA, PODVERGNUTYKH ODNOKRATNOMU VOZDEISTVIU USKORENIYA].**

N. S. Artem'eva, A. A. Giurdzhian, and L. A. Radkevich (USSR, Acad. of Med. Sci., Inst. of Exptl. Biol., Moscow).

*Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 64, Aug. 1967, p. 114-116. 7 refs. In Russian.

The morphological condition of ovaries after a single acceleration of 5 g and 20 g was studied on 60 mature female rats of Wistar and August strains. Transient disorders of sex cycles (one to two wk.) were more marked with an acceleration of 20 g. Atresia of follicles sometimes cystic degeneration of follicles became more marked. After removing 75% of ovarian tissue, overactive proliferation and regeneration of the ovary were observed.

## A67-82106

**THE INFLUENCE OF EXTERNAL GAMMA-RADIATION ON ANTIBODY PRODUCING CELLS BY ERNE'S METHOD [IZUCHENIE VLIYANIYA VNESHNEGO GAMMA-OBLUCHENIYA NA ANTITELOPRODUTSIRUIUSHCHIE KLETKI METODOM ERNE].**

I. V. Petrova and A. L. Kartasheva (USSR, Acad. of Med. Sci., Inst. of Med. Radiol., Obninsk).

*Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 64, Aug. 1967, p. 68-69. 8 refs. In Russian.

Mice of CBA strain were immunized once with sheep erythrocytes and then on the third day irradiated with various doses (330 and 660 r) gamma-rays. The number of antibody-producing cells decreased compared to the non-irradiated mice by two to seven times. The difference is statistically significant. Titers of antibodies in the blood did not differ substantially from those in immunized, but non-irradiated mice.

## A67-82107

**CHANGES IN THE CARDIOVASCULAR SYSTEM OF MAN DURING WORK OF SMALL GROUPS OF SKELETAL MUSCLES [IZMENENIYA V SERDECHNOSOSUDISTOI SISTEME CHELOVEKA PRI RABOTE MALYKH GRUPP SKELETNYKH MYSHTS].**

K. M. Smirnov, I. M. Popov, and V. M. Komarova (S. M. Kirov Inst. for Advan. Training of Physicians, Leningrad, USSR).

*Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 64, Aug. 1967, p. 11-13. 6 refs. In Russian.

The arterial pressure was studied in one group of individuals who were made to knock on the table with the wrist, in other experiments subjects worked on a veloergometer. In both series of experiments the work was continued until complete fatigue was achieved. Work of the wrist produced a clearcut increase of diastolic and mean blood pressure, statistically greater than after work on a veloergometer. In work of small groups of muscles the peripheral vascular resistance did not change, while when large masses of muscles were involved in work the peripheral resistance fell. Fatigue after work with small groups of muscles is related to widely spread pressor reactions in the cardiovascular system.

## A67-82108

## FOODS FOR ASTRONAUTS.

Mary V. Klicka, H. A. Hollender, and P. A. Lachance (NASA, Houston, Tex. and U.S. Army Natick Labs., Natick, Mass.) (*Am. Dietetic Assn., 49th Ann. Meeting, Boston, Oct. 27, 1966*). *Journal of the American Dietetic Association*, vol. 51, Sep. 1967, p. 238-245. 6 refs.

Problems associated with the design and fabrication of foods for consumption during space travel were discussed. Requirements of the Gemini, Apollo and Mercury projects for food, food packaging, nutrition and other design parameters were presented in table form. Some of the research concerned with the problem of an appropriate edible coating for bite-size food and sandwiches was reported. Rehydratable foods, bite-size foods and sandwiches were described, and the criteria necessary for acceptability were included. Nutrition for the astronauts is controlled through menu planning.

## A67-82109

## ENERGY METABOLISM OF RATS BORN AND RAISED IN A LOW PRESSURE PURE OXYGEN ENVIRONMENT.

William E. Pepelko (School of Aerospace Med., Aerospace Med. Div., Brooks AFB, Tex.) *Proceedings of the Society for Experimental Biology and Medicine*, vol. 125, Jul. 1967, p. 731-734. 8 refs.

Ten rats born and maintained in a low pressure, pure oxygen environment did not differ in growth rates from ground level controls. However, overall digestibility was lowered in experiments, 74.3% vs 79.5% for controls ( $P < .001$ ), with even greater differences in protein digestibility, 65.5% vs 74.6% ( $P < .001$ ). Although less fat was digested by experimentals, 75.6% vs 81.4% for controls, these differences were not significant. Net caloric intake was similar due to a slightly greater food intake by experimentals. Calories given off as heat did not differ, suggesting similar metabolic rates.

## A67-82110

## ACTIONS OF NICOTINE UPON THE LIMBIC SYSTEM.

C. Stümpf and G. Gogolák (Vienna U., Pharmacol. Inst., Austria). *Annals of the New York Academy of Sciences*, vol. 142, Mar. 15, 1967, p. 143-158. 41 refs.

This paper deals with the action of nicotine upon the electroencephalogram (EEG) and unit activity of the hippocampus and septum in the rabbit. Nicotine in small dosage produces hippocampal theta rhythm only. After larger doses, the theta rhythm is followed by seizure discharges which may migrate to the septum, where the discharges may outlast the seizure activity in the hippocampus. The threshold dose of nicotine required to elicit hippocampal seizures is conspicuously greater in rabbits pretreated with sodium perchlorate than in controls. Septal lesions abolish the initial theta rhythm, but they do not affect the hippocampal seizure activity. The initial theta rhythm is accompanied by an increased firing rate of the hippocampal pyramidal cells, whereas these cells are silent during the full-blown hippocampal seizure. After the administration of nicotine, the cells of the medial septum nucleus discharge in bursts which show a correlation with the hippocampal theta waves. During the hippocampal seizure discharges, these cells may continue to discharge in bursts, or they may fire in correlation with the EEG seizure discharges, or they may discharge in a complex firing pattern. The results have been discussed with reference to the site and mode of action of nicotine upon the central nervous system. Evidence was presented for the fact that the thyroid gland plays an important role in action of nicotine upon the central nervous system.

## A67-82111

## EFFECTS OF NICOTINE ON THE ELECTROENCEPHALOGRAM OF THE RABBIT.

V. G. Longo, F. Guinta, and A. Scotti de Carolis (Ist. Superiore di Sanità, Rome and Sassari U., Dept. of Pharmacol., Italy). *Annals of the New York Academy of Sciences*, vol. 142, Mar. 15, 1967, p. 159-169. 16 refs.

AMA Comm. for Res. on Tobacco and Health supported research.

Comments were made upon the results dealing with the electroencephalographic (EEG) effects of nicotine, integrating them with more recent data. From the above-referred results, the following conclusions were made: (1) the EEG convulsive seizure, described originally in the rabbit, is also present in the guinea-pig and in the rat; the cat, while exhibiting the motor seizure, does not present the EEG convulsions; (2) nicotine, applied *in loco* over various cortical areas, caused the appearance of convulsive electrical activity, accompanied by Jacksonian motor phenomena; this effect is obtained at concentrations of 1 to 2%. (3) further studies on the antagonists of the central effects of nicotine have pointed out that there are drugs possessing more specific action than that of the so-called "antiparkinsonians." Mecamylamine, in particular, is able to prevent the occurrence of nicotine convulsions, in doses of 0.5 mg/kg. (i.v.). Dihydro- $\beta$ -erthroidine is effective only at doses of 7 mg/kg. (i.v.). The fact that drugs have been identified possessing the ability of antagonizing specifically the central effects of nicotine, offers an excellent tool to be used in the differentiation between nicotinic and muscarinic central effects.

## A67-82112

## SOME INTERACTIONS OF NICOTINE WITH OTHER DRUGS UPON CENTRAL NERVOUS FUNCTION.

Alfredo J. Vazquez and James E. P. Toman (Chicago Med. School, Ill.).

*Annals of the New York Academy of Sciences*, vol. 142, Mar. 15, 1967, p. 201-215. 10 refs.

Grants PHS MH 05503, PHS MH 04545, and PHS MH 06298; Council for Tobacco Res. and Abbott Labs. supported research.

Nicotine causes transient depression of the most prominent fast component and enhancement of the most prominent slow component of the evoked potentials of the rabbit sensorimotor cortex. Both effects are blocked by beta-erythroidine, which itself produces similar effects at higher dosage. Nicotine can be used to differentiate between chlorpromazine, which blocks the action upon the fast component, and imipramine, which blocks action upon the slow. Nicotine neither induces nor blocks the total pattern of rage behavior in cats, in which a muscarinic link is prominent, but instead shows blocking effects against some fractional motor components of rage induced by electrical stimulation of amygdala and hypothalamus. Cigarette smoking and deprivation of smoking are associated with change in visually evoked averaged electroencephalogram (EEG) potentials in human subjects. Nicotine has direct blocking effects upon axons by a mechanism different from that of local anesthetics. Nicotine has a minor action upon electroshock seizures in mice, blocking the inhibition characteristic of amphetamine and epinephrine. It is suggested that the sites of nicotinic cholinergic actions, as exemplified by those of nicotine itself, are irregularly distributed in the central nervous system. Although demonstrable in the cortex, nicotine actions in two instances (cat rage and mouse electroshock seizures) are more prominent on the "downstream" (motor) side of the involved pathways. Finally, the effects of nicotine are more those of blockade than of excitation in the central nervous system.

## A67-82113

## A NEW ROLE FOR THE PARATHYROID GLANDS IN CALCIUM HOMEOSTASIS.

**A67-82114**

Ruben F. Gittes, Samuel A. Wells, and George L. Irvin, III (Mass. Gen. Hosp., Dept. of Surg., Urol. Serv., Boston and Natl. Cancer Inst., Surg. Branch, Bethesda, Md.).

(*Am. Urol. Assn., Inc., Ann. Meeting, Chicago, Ill., May 30–Jun. 2, 1966*). *Journal of Urology*, vol. 97, Jun. 1967, p. 1082–1089. 18 refs.

Apparently conflicting reports of previous investigators of calcium homeostasis were reviewed. A new hypothesis was presented which reconciled the conflicting observations and incorporated their evidence in a theory of parathyroid and thyroid interaction in calcium homeostasis. Transfusion experiments between parathyroid-loaded and thyroid-loaded guinea pigs demonstrating the effect of a parathyroid homogenate in normocalcemic animals pointed to the presence of a thyrocalcitonin-releasing, rather than a thyrocalcitonin-enhancing factor. The hypothesis and experimental evidence presented permitted a unified concept of the mechanism of the calcium-lowering response in calcium homeostasis.

**A67-82114****CHANGES IN NUCLEIC ACID METABOLISM OF TUMOR CELLS UNDER HIGH PRESSURE OXYGEN.**

T. Watari, T. Hishizawa (Tokyo U., Fac. of Med., Dept. of Radiol., Hongo, Japan), and H. Matsudaira (Res. Inst., Natl. Cancer Center, Radiobiol. Div., Tsukiji, Tokyo, Japan).

*Nature*, vol. 215, Sep. 23, 1967, p. 1378–1379. 15 refs.

Min. of Educ., Japan supported research.

The effect of high pressure oxygen on nucleic acid metabolism was studied in Yoshida ascites hepatoma cells *in vitro* and Ehrlich ascites tumor cells *in vivo*. Cell suspensions were pressurized in a small oxygen chamber and irradiated. The radioactivity of the nucleic acid fractions was determined, and DNA was measured. The effects of irradiation under high pressure oxygen were slightly greater than those of irradiation in air when the enhancement of incorporation by high pressure oxygen *per se* was taken into account. High pressure oxygen may alter the state of the oxygenation of ascites tumor cells, producing changes in cell metabolism, but the reason for, and possible significance of the increased incorporation of radioactive precursors into DNA exposed to high pressure oxygen both *in vitro* and *in vivo* are not yet clear.

**A67-82115****PERCEPTUAL SPACE AND THE LAW OF CONSERVATION OF PERCEPTUAL INFORMATION.**

Y. Akishige (Kyushu U., Dept. of Psychol., Fukuoka, Japan).

*Zeitschrift für Psychologie*, vol. 173, no. 3/4, 1967, p. 153–158.

Perceptual constancy, the mental function which constructs a stable perceptual world in the midst of ever-changing stimuli, was treated mathematically. Most perceptual constancies are linear functions of two variables. In functions of many variables, the formation of a hyperplane in the coordinate space signifies the existence of constancy. Investigations conducted on perceptual constancy have revealed the following facts: (1) when the perceptual field is constant and furnishes sufficient information, perfect constancy is attained; (2) when the perceptual field is restricted and does not yield sufficient information, perceptual constancy is reduced according to the degree of restriction; and (3) when no reference information is given (as in uniform stimulation, for example), no constancy is attained and the percept is uniquely determined by the quality and amount of stimulus energy. The following conclusions were reached: (1) perceptual information is impossible without stimulus energy, but the essential moment in its development is not the amount of energy, but its distribution; and (2) perceptual space is subject to the law of conservation of perceptual information, which is not a speculative law but an empirical one. The quantitative qualification of the information concept is a problem for future consideration.

**A67-82116****TRANSPORT OF INVALIDS BY AIR.**

K. G. Bergin.

*British Medical Journal*, vol. 3, Aug. 26, 1967, p. 539–543. 7 refs.

General practitioners not infrequently are uncertain whether a patient is fit to travel by air. This article is based on a guide prepared to assist in general terms on the principal factors to be considered.

**A67-82117****ELECTROENCEPHALOGRAPHIC AND BEHAVIORAL AROUSAL EFFECTS OF SMALL DOSES OF NICOTINE: A NEUROPSYCHOPHARMACOLOGICAL STUDY.**

Edward F. Domino (Mich. U., Dept. of Pharmacol., Ann Arbor). *Annals of the New York Academy of Sciences*, vol. 142, Mar. 15, 1967, p. 216–244. 38 refs.

Grant PHS B-01311 and Council for Tobacco Res. supported research.

A neuro- and psychopharmacologic approach was used to determine the central actions of nicotine. Since nicotine releases acetylcholine, catecholamines, serotonin, and vasopressin, these compounds were studied as well. The effects of nicotine and related drugs upon the electroencephalogram (EEG) of acute and chronic animals were determined. In addition, the effects of nicotine upon gross and conditioned avoidance behavior were studied to provide behavioral correlates of the EEG changes. Nicotine, in doses of 5 to 20 g./kg. i.v., caused EEG activation in acute experiments which was related to a behavioral wake-up effect. This action, which lasted only a few minutes, involved both central and peripheral components. Nicotine also caused an increase in fast-wave sleep, which may be related to vasopressin release. The initial behavioral consequences of small doses of nicotine were consistent with a brief wake-up effect. In rats trained to pole jump, nicotine in subcutaneous doses of 80 and 160 µg./kg. produced a transient decrease in mean avoidance latency within one or two min. In contrast, saline or 40 µg./kg. of nicotine, produced a slight increase in avoidance latency. Mean avoidance latency decreased more in "slow" rats than in "fast" ones. The effects of nicotine were highly significant; the role of slightly increased percentages of unconditioned stimuli (electroshock) in increasing motivation in the nicotine-treated animals needs to be studied further. In conclusion, the research reported indicated that nicotine, in doses comparable to those absorbed by a man smoking tobacco, has pharmacological actions consistent with a brief wake-up effect as well as a transient period of mild central nervous system depression. The behavior depressant effects of nicotine were more evident with larger doses.

**A67-82118****ELECTROENCEPHALOGRAPHIC CHANGES IN MAN FOLLOWING SMOKING.**

Henry B. Murphree, Carl C. Pfeiffer, and Lillys M. Price (N. J. Neuropsychiat. Inst., Bur. of Res. in Neurol. and Psychiat., Princeton). *Annals of the New York Academy of Sciences*, vol. 142, Mar. 15, 1967, p. 245–260.

Grants PHS MH-06713 and PHS MH-04229; Am. Med. Assn. Educ. and Res. Found. and Geschickter Fund for Med. Res. supported research.

The progress made in trying to define the actions of drugs on the central nervous system using quantitative electroencephalographic (EEG) techniques was reported. Computer methods are now being developed to determine grand means and between-subject variances for the entire spectrum from one to 36 c.p.s. In this way, the EEG effects of smoking in subjects with comparable initial states can be studied by means of analyses of variance or other statistical methods which take into account the

time-serial nature of the EEG. From the work illustrated, the following was concluded: (1) the effects of drugs on the central nervous system as reflected in the EEG are dependent upon the state of the subject before dosage; (2) there may be a very rapid, reflex effect upon the EEG of smoke inhalation occurring before any blood-borne pharmacological effect; (3) the effects of smoking, as reflected in the EEG appear to be stimulant rather than tranquilizing, although subjects may exhibit individual differences; and (4) very slight stimulant effects may be reflected in a reduction in variance of the EEG before any reduction of alpha or total energy.

## A67-82119

**THE EFFECT OF MUSCULAR WORK ON THROMBOCYTE COUNTS IN LABORATORY CONDITIONS [VPLYV SVALOVEJ PRACE NA POCET TROMBOCYTOV ZA LABORATORNYCH PODMIENOK].**

E. Horniak, M. Hájková, and L. Komadel.  
*Bratislavské Lekárske Listy*, vol. 47, Mar. 1967, p. 293-298. 22 refs. In Slovak.

Preliminary observations in 18 oarsmen and 18 untrained subjects at rest, after a work load and during recovery under laboratory conditions showed that thrombocyte counts undergo no changes during systematic sports training. At rest both in trained and in untrained subjects, practically equal values were found. The thrombocyte count did not significantly change in the course of all-year sports training, nor was it affected by variations in the state of physical performance and preparedness obtained by training. The work load produced atypical changes in thrombocyte counts. A great range of values was noted in groups of subjects so that arithmetic means seldom differed in a statistically significant way. In trained sportsmen after a work load, the thrombocyte count often showed a moderate drop, but in untrained subjects, a moderate rise in thrombocyte counts was often noted.

## A67-82120

**MEASUREMENT OF HEAT-EXPENDITURE FROM SKIN AND CLOTH BY STREAM CALORIMETRY IN THE AIR-COVER LAYER [MERENI VYDEJE TEPLA Z KUZE A ODEVU PROUDOVOU KALORIMETRII NA VZDUSNE OBALOVE VRSTVE].**

J. Isper and E. Sedláčková.  
*Fysiatrický a reumatologický věstník*, vol. 45, Jun. 1967, p. 165-172. 9 refs. In Czech.

The thermoregulation responses of the organism to the partial or total covering of the skin surface by cloth of various insulation ability were investigated by means of stream calorimetry in the air-cover layer. Difference between the room temperature and the mean skin temperature, eventually the mean temperature on the cloth surface was in 34 experiments carried out in four experimental subjects kept on the average of 7.2°C. This corresponds to the heat-expenditure of about 65-72 kcal./hr.  $\cdot$  m<sup>-2</sup> in sitting, in addition to losses caused by insensitive perspiration and the respiratory ways. The differences between the individual experimental subjects were not statistically significant. For the lower half of the body the mean superficial temperature was significantly lower, i.e., by 1.09°C. The specific heat-expenditure was by 14% lower than that of the upper body-half. In case that only the upper or only the lower body-half is covered by cloth of various insulation properties, the temperature-gradient of the covered body-half is stabilizing towards the room temperature by 1-3°C. lower than that of the uncovered skin. The difference increases according to the increased insulation property of the cloth. It may be concluded that the organism, even if without cloth covered with cloth of various insulation properties is able to control precisely and sensitively the heat-expenditure according to the conditions of

the environment and the actual metabolism. However, the organism is not able to levelize the half or partial cover or exposure of the skin-surface, by the local active hyperemia. The blood stream in the skin remain in the same level on the whole body-surface as long as the vasoconstriction effect does not interfere. The total skin circulation increases according to the insulation ability of the cloth, however, the relationship is not of linear character.

## A67-82121

**MODE OF ACTION OF TOBACCO SMOKE INHALATION UPON THE CEREBRAL CIRCULATION.**

Robert A. Kuhn (N. J. Coll. of Med., Dept. of Surg., Div. of Neurosurg., Jersey City).  
*Annals of the New York Academy of Sciences*, vol. 142, Mar. 15, 1967, p. 67-71. 5 refs.

Retrograde brachial-cerebral angiography was used to study cerebral circulation of 20 patients before and after tobacco "over-smoking". Tobacco smoke inhalation produced acceleration of flow in the cerebral precapillary network and increased arteriole counts. This effect was generally related inversely to age. It is not yet known which of the constituents of tobacco smoke was responsible for the effects observed.

## A67-82122

**EFFECTS OF AN EXERCISE PROGRAM ON PLASMA LIPIDS OF SENIOR AIR FORCE OFFICERS.**

Archie A. Hoggman, William R. Nelson, and Frank A. Goss (USAF Hosp. Andrews, Malcolm Grow USAF Clin. Center, Andrews AFB, Washington, D. C.).  
*American Journal of Cardiology*, vol. 20, Oct. 1967, p. 516-524. 31 refs.

The effect of exercise, age and season on plasma lipids was surveyed by utilizing 355 senior military officers of the Air Force. A group of 229 officers routinely engaging in a phasic or dynamic exercise program for at least a year was analyzed against 126 officers not regularly exercising. The high exercise group demonstrated lower levels of total lipid, cholesterol, beta lipoprotein and triglycerides which were statistically significant. Very low density (VLD) lipoprotein was also significantly lower when only those officers with below median values of this lipoprotein were considered. Alpha lipoprotein significantly increased with exercise. Increases in phospholipids and alpha lipoprotein were statistically significant as age increased from the 40 through 54 span of the study. Significant differences in lipids were not obtained in considering the season blood was drawn. Significant positive correlations of per cent deviation from ideal weight with total lipids, triglycerides and VLD lipoprotein were found. Alpha lipoprotein gave a significant negative or inverse correlation. Correlation coefficients among the lipid parameters themselves were obtained. The most interesting finding was the negative correlation of -0.30 between alpha lipoprotein and VLD lipoprotein.

## A67-82123

**CHARACTERISTICS OF VISUAL AND KINESTHETIC MEMORY CODES.**

Michael I. Posner (Ore. U., Eugene and Portland).  
(*Symp. of Attention and Reaction Time, Soesterberg, The Netherlands, Aug. 1966*).  
*Journal of Experimental Psychology*, vol. 75, Sep. 1967, p. 103-107. 8 refs.  
Grant NSF GB 3939.

This study compares retention of kinesthetic information from blind positioning movements with information from similar visually guided movements. Reproduction of the visually guided

movement shows little or no forgetting when the interval (20 sec.) is unfilled and forgetting is greatly increased by an interpolated attention-demanding task. The blind movements show clear forgetting even with an unfilled interval and are not much affected by the interpolated task. These results confirm previous findings that storage in these tasks involves more than verbal labels and suggest that visual and kinesthetic STM codes have different central processing requirements.

#### A67-82124

##### **SPREAD OF AIRBORNE BACTERIA PATHOGENIC FOR MAN.**

R. E. O. Williams (St. Mary's Hosp. Med. School, Wright-Fleming Inst., Dept. of Bacteriol., London, Great Britain).

IN: AIRBORNE MICROBES; Seventeenth Symp. of the Soc. for Gen. Microbiol. held at the Imp. Coll., London, Apr. 1967. Cambridge, Great Britain, University Press, 1967, p. 268-285. 61 refs.

Evidence for spread of airborne bacteria can be obtained from: (a) the primary site of implantation in the recipient host; (b) demonstration of a relation between the occurrence of infection and the presence or numbers of microbes in the air; (c) epidemiological studies of the spread of the infection in relation to such factors as season, location, or propinquity of source and recipient; and (d) the results of measures specifically designed to limit the spread of airborne infection. In attempting to classify the inhalation infections on the basis of the presumed site of implantation of the microbes in the respiratory tract, three patterns are recognized. First, the microbes may be deposited in the lung and set up infection there, as with pulmonary tuberculosis. Second, they may be deposited in the nose or throat, and cause upper respiratory tract disease. And third, the site of deposition may differ widely from the site in which invasion and disease occurs. This phenomenon is certainly exemplified by pulmonary anthrax and meningococcal meningitis, and probably also by pneumococcal pneumonia.

#### A67-82125

##### **MICROBIAL SURVIVAL.**

J. D. Anderson and C. S. Cox (Microbiol. Res. Estab., Salisbury, Great Britain).

IN: AIRBORNE MICROBES; Seventeenth Symp. of the Soc. for Gen. Microbiol. held at the Imp. Coll., London, Apr. 1967. Cambridge, Great Britain, University Press, 1967, p. 203-226. 132 refs.

A review is presented of laboratory studies of microbial survival in aerosols. Such studies show that the effects of growth medium, method of growth, and metabolic state of the organism are superimposed upon that of species and strain. The nature of the atmospheric environment, including its relative humidity, composition, and temperature can be crucial. Electromagnetic radiation can reduce the survival of microbial aerosols. Results are also influenced by other conditions, such as choice of spray fluid and the time and manner of collection. No simple relationship exists between the degree of survival and time of storage in aerosols. For fragile organisms the effect of collecting device, and the nature of osmotic pressure of the collecting fluid can be of paramount importance.

#### A67-82126

##### **BRAIN METABOLISM DURING FASTING.**

O. E. Owen, A. P. Morgan, H. G. Kemp, J. M. Sullivan, M. G. Herrera, and G. F. Cahill, Jr. (Harvard Med. School, Depts. of Med. and Surg., Elliott P. Joslin Res. Lab.; Peter Bent Brigham Hosp., Cardiovascular Unit; and Diabetes Found., Inc., Boston, Mass.).

*Journal of Clinical Investigation*, vol. 46, Oct. 1967, p. 1589-1595. 40 refs.

Grants DA-49-193-MO-2337, PHS AM-09584-02, PHS AM-09748-02, PHS 8 MO1-FR-31-06, PHS T1-AM-5077-11, PHS 5-RO1-AM-02657-07, PHS 1-T1-HE-05679-02, and PHS HE-08591-02; AEC, Adler Found., Inc., and John A. Hartford Found., Inc. supported research.

Catheterization of cerebral vessels in three obese patients undergoing five to six wks. of starvation demonstrated that beta-hydroxybutyrate and acetoacetate replaced glucose as the predominant fuel for brain metabolism. A strikingly low respiratory quotient was also observed, suggesting a carboxylation mechanism as a means of disposing of some of the carbon of the consumed substrates.

#### A67-82128

##### **PROTECTION OF CANINE PANCREATIC ULTRASTRUCTURE AGAINST RADIATION DAMAGE BY POST-TREATMENT WITH ALLOXAN.**

Klaus F. Wellman, Bruno W. Volk, and Sydney S. Lazarus (Jewish Chronic Disease Hosp., Isaac Albert Res. Inst., Brooklyn, N. Y.). *Nature*, vol. 216, Oct. 7, 1967, p. 86-87. 8 refs.

NIH supported research.

Dogs which received alloxan treatment several days after irradiation were examined with the electron microscope for cytological alterations of the pancreatic ultrastructure. The post-treatment of dogs with a single, small non-diabetogenic dose of 15 mg./kg. of alloxan monohydrate protected the pancreatic ultrastructure against severe irradiation damage. It was suggested that the radioprotective action of alloxan may be due to the reduction of protein synthesis induced by alloxan and to its known effect on amino acids and -SH radicals.

#### A67-82129

##### **VISUAL ILLUSIONS DURING HEAD MOVEMENT IN LESIONS OF THE BRAIN STEM.**

Morris B. Bender and Martin Feldman (Mt. Sinai School of Med., Dept. of Neurol., New York City, N. Y.).

(*Hung. Soc. of Neurol. and Psychiat. and Hung. EEG Soc., 25th Natl. Congr., Budapest, Oct. 7, 1966*).

*Archives of Neurology*, vol. 17, Oct. 1967, p. 354-364. 34 refs.

Grants PHS NB 05221 and PHS NB 04576.

Movements of the body or head or both in patients with vestibular and/or brain stem disease provoked an optic illusion of motion of a visually fixated target. The illusory motion was often related to defective compensatory eye movements (vestibulo-ocular reflex). The illusory motion was always initiated by motion of the body or head or both, not by eye movements. These illusions are symptoms of faulty integration of vestibular, oculomotor, and visual system function, all of which interact in visual perception. They are produced by lesions or caused by dysfunctions of any one of the systems. The greater the stress placed on any one of these systems, the more prominent are the illusions.

#### A67-82130

##### **EFFECTS OF SIMULATED HIGH ALTITUDE ON PREGNANCY.**

Liliane Delaquerrière-Richardson and Enrique Valdivia (Wis. U., School of Med., Dept. of Pathol., Madison).

*Archives of Pathology*, vol. 84, Oct. 1967, p. 405-417. 33 refs.

Experimental hypoxia caused a high perinatal mortality, abortions, and in utero deaths in the offspring of gravid guinea pigs exposed, during the last half of gestation, to simulated altitudes of 12,800 to 15,000 ft. Massive and focal vascular lesions were observed in corresponding placentas.

**A67-82131  
PHYSIOLOGICAL MASKING IN THE PERIPHERAL  
AUDITORY SYSTEM. III. EFFECT OF VARYING TEST-CLICK  
INTENSITY.**

Alfred C. Coats (Baylor U., Coll. of Med., Dept. of Physiol., Houston, Tex.).

*Journal of Neurophysiology*, vol. 30, Sep. 1967, p. 931-948. 7 refs.

NASA Grant NSG-390.

Amplitudes of peripheral click action potentials were reduced by sounding either a white-noise or pure-tone masking stimulus. The effect of changing the intensity of the masked (test-click) stimulus was studied. The following similarities between the effects of varying the intensities of the masking and masked stimuli were found: (a) by manipulating either intensity, amount of masking may be changed, but the time course of recovery from masking is unaffected; and (b) manipulation of either intensity so as to increase amount of masking increases the rate and depth of the masking-duration effect. At moderate masking intensities, when the test-click stimulus was increased above a certain intensity level, the difference between masked and unmasked action potential amplitude remained constant. Above a masking intensity of 75 to 85 db., this "difference plateau" disappeared. This observation appears to support the previous suggestion that there is a "transition" masking intensity located below the well-known fatigue level. The above observations were discussed in terms of the hypothesis that amount of masking is related to amount of "overlap" of the responses to the masked and masking stimuli within the population of responding units.

**A67-82132  
GLARE SENSITIVITY RELATED TO USE OF CONTACT  
LENSES.**

David Miller, Ernst Wolf, Sandra Geer, and Victoria Vassallo (Mass. Eye and Ear Infirmary, Cornea Serv. and Retina Found., Dept. of Retina Res., Boston).

*Archives of Ophthalmology*, vol. 78, Oct. 1967, p. 448-450.

Grants PHS 361 902 and PHS B-1482.

Fifty subjects were tested in regard to their sensitivity to scotomatic glare before and after wearing contact lenses. A statistically significant increase in glare sensitivity was noted in those subjects who developed epithelial edema while wearing their contact lenses, while no difference was found in subjects who did not develop epithelial edema. Lenses slipping below the pupillary border do not increase glare sensitivity.

**A67-82133  
CALCULATION OF METABOLIC MIXTURE AND WATER  
BALANCE USING FORTRAN PROGRAMS.**

E. M. Bernauer, P. A. Mole, and R. E. Johnson (Ill. U., Urbana).

*Metabolism*, vol. 16, Oct. 1967, p. 899-909. 14 refs.

Contract DA-49-193-MD-2222.

The standard methods and equations for calculating metabolic mixture and water balance are reviewed. A brief general description of Fortran programming is presented. The basic tasks required to develop the source and object programs for computer analysis of metabolic mixture and water balance are outlined. The source and object programs for Fortran computer analysis are presented in table form as they would appear in practical application. The computer analysis is cross-referenced with the equations and standard methods of calculation (i.e., desk calculator and long-hand method) for clarity and emphasis. The application and facility of computer analysis are given in addition to certain limitations of the equations.

**A67-82134**

**HYPOTHALAMIC SELF-STIMULATION: INTERACTION OF  
HYPOXIA AND STIMULUS INTENSITY.**

Zoltan Annau and Stephen A. Weinstein (Johns Hopkins U., Depts. of Environ. Med. and Psychiat., Lab. of Behavioral Physiol., Baltimore, Md.).

*Life Sciences*, vol. 6, Jul. 1, 1967, p. 1355-1360. 16 refs.

NASA Grant 21-001-035, Contract ONR NR 102-101, Grants DA-49-193-MD-2726, DA HG. 18. 7001, PHS HE 01929, PHS TG-HTS 5453, and PHS HE 06945.

The effects of hypoxia on a skilled motor task were systematically investigated, and the interaction between hypoxia and changes in central nervous system activity due to changes in the intensity of the brain stimulating current were determined in rats. The results indicated an interaction between the motivational level and performance in hypoxia. Several hypotheses were presented to account for the results utilizing research done by previous investigators.

**A67-82135**

**SYNODIC MONTHLY MODULATION OF THE DIURNAL  
RHYTHM OF HAMSTERS.**

Frank A. Brown, Jr. and Young H. Park (Northwestern U., Dept. of Biol. Sci., Evanston, Ill.).

*Proceedings of the Society for Experimental Biology and Medicine*, vol. 125, Jul. 1967, p. 712-715. 11 refs.

Contract ONR 1228-30 and Grant NSF GB-3481.

Further evidence is submitted that a terrestrial mammal, the hamster, has a deep-seated lunar rhythmic component which appears to be derived directly in response to subtle, pervasive geophysical variations. This is reflected in the degree of spontaneous activity and hence would obviously be importantly reflected in standard metabolic rate. The mean monthly range for the motor activity is more than 15%. This suggests that a sol-lunar rhythmic complex such as is now well-established for marine intertidal species occurs also in non-marine forms. It also suggests strongly that fluctuations in hitherto largely disregarded pervasive, weak geophysical variations have substantial influences upon mammals.

**A67-82136**

**EFFECTS OF HYPERBARIC OXYGENATION ON  
METABOLISM. IV. TIME SEQUENCE OF BIOCHEMICAL  
CHANGES AT 5 ATMOSPHERES 100% OXYGEN.**

Aaron P. Sanders and Iris H. Hall (Duke U., Med. Center, Dept. of Radiol., Div. of Radiobiol., Durham, N. C.).

*Proceedings of the Society for Experimental Biology and Medicine*, vol. 125, Jul. 1967, p. 716-721. 27 refs.

Contracts ONR N00014-67-A-0251-002, ONR NR 102-682, Grants NIH Ca-07581-03, NIH R01-GM 14226-01, and NIH 5-T-1-MH-8394-02.

Fasted rats (150-200 g.) were exposed to 100% oxygen at 5 ata pressure for 30, 60 and 90 min., and ATP concentration, succinic dehydrogenase activity, percent free cathepsin activity, percent free ribonuclease activity, acid soluble and total nitrogen, and tissue buffer capacity were determined on brain, liver and kidney. ATP concentrations decreased at 30 min., returned toward normal at 60 min., and showed marked decrease at 90 min. Free ribonuclease activity showed an inverse relationship to ATP concentration. This would implicate ATP in the maintenance of lysosome membrane integrity with respect to ribonuclease permeability. Succinic dehydrogenase activity decreased continuously with time of high pressure oxygen (HPO) exposure. Free cathepsin activity increased continuously through the 90 min. exposure in brain and liver. Free cathepsin activity increased in kidney through 60 min., but at 90 min. showed a decrease which is attributed

to a marked decrease in both free and total cathepsin activity at this time. Tissue buffer capacity in all three tissues showed a decrease in tissue acidity at 30, 60, and 90 min. of HPO exposure. This is attributed to hyperventilation by the animal during the HPO exposures. Acid soluble nitrogen was normal at 30 min., slightly decreased at 60 min. and markedly increased at 90 min. in the three tissues. This marked increase during the 60 to 90 min. exposure period coincides with the time interval in which the animals exhibited symptoms of acute hyperoxia toxicity. Significance and implication of the results are discussed.

#### A67-82137

##### IDENTIFICATION OF FORM IN PATTERNS OF VISUAL NOISE.

Harry Munsinger and Kent Gummerman (Calif. U., San Diego). *Journal of Experimental Psychology*, vol. 75, Sep. 1967, p. 81-87. 7 refs. Carnegie Corp. supported research.

Two studies are reported which assess the effects of differing types of visual noise on accuracy of identification of random shapes presented tachistoscopically. Second grade, fifth grade, and college adult subjects ( $N = 4$ ) were presented grids (noise), which were either systematic or random in their distribution of lines along the X and Y coordinates, and of either low or high density. The results of the studies support the following conclusions. Identification of forms under conditions of visual noise is a complex function of density of noise, type of noise, age of the subject, and amount of experience with the types of visual disturbance. Specifically, older subjects are better able to separate signal from low-density noise than from high; high-variability forms are less disturbed by high-density noise than are low-variability forms; subjects are able to take account of predictable aspects of background noise to separate systematic noise from signal. Finally, children can more efficiently learn to extract signal from systematic noise than from random noise through experience.

#### A67-82138

##### ACCELERATION REGISTROGRAPHY IN STANDING POSITION—RESULTS IN NORMAL HUMAN BEINGS.

Osamu Tsujikawa (Yamaguchi U., School of Med., Dept. of Otolaryngol., Ube, Japan). *Bulletin of the Yamaguchi Medical School*, vol. 13, Sep. 1966, p. 131-148. 10 refs.

A method of "Static Functional ARG Test" was presented with results of the test in normal human beings. The waves of Acceleration Registrograms (ARGs) in the standing position were composed of waves of short amplitude (less than 0.1 g) whether the subject closed his eyes or not. The waves of ARGs in Mann's position were mainly composed of waves of short amplitude whether the subject closed his eyes or not. Occasionally, a few waves of medium amplitude (0.1-0.25 g) were recognized, but they were not observed continuously. The waves of Gonio-ARGs were mainly composed of waves of short amplitude, while a few waves having medium amplitude were recognized, but they were not observed continuously. The optic effects on the waves of ARGs were latent in a normal standing position, but were very evident in Mann's position or on the plank of the goniometer.

#### A67-82139

##### THE ROLE OF PERIPHERAL VISION IN STATIC BALANCING.

J. Dickinson and J. A. Leonard (Nottingham U., Dept. of Psychol., Great Britain).

*Ergonomics*, vol. 10, Jul. 1967, p. 421-429. Med. Res. Council supported research.

A study was made to determine the role of peripheral vision in static balancing. Three groups of subjects were tested under sighted and blindfold conditions, and also under a minimal cues condition. One of these groups was trained in the use of peripheral vision and after five days achieved sighted competence under the minimal cues condition. A second group had no training, but practiced for a similar period and showed no such improvement. The third group was tested with progressively decreasing amounts of peripheral vision, and the stage at which deterioration in performance occurred was noted. The results are discussed in relation to the use of peripheral vision, and in the relevance of this work to the training of the blind.

#### A67-82140

##### SOME EXPERIMENTS ON THE FUNCTION OF MENTAL TRAINING IN THE ACQUISITION OF MOTOR SKILLS.

E. Ulich (Munich U., Psychol. Inst., West Germany).

(*Ergonomics Res. Soc., Ann. Conf., Manchester, 1966*).

*Ergonomics*, vol. 10, Jul. 1967, p. 411-419. 11 refs.

The experiments reported here concern different methods of learning in motor performance with particular reference to mental training. These studies are part of research on different variables in the acquisition of motor skills under laboratory and industrial conditions.

#### A67-82141

##### THE EFFECT OF POSTURE ON THE SOLAR RADIATION AREA OF MAN.

E. J. Ward and C. R. Underwood (Natl. Inst. for Med. Res., Div. of Human Physiol., London, Great Britain).

*Ergonomics*, vol. 10, Jul. 1967, p. 399-409. 10 refs.

This paper deals with the direct radiation areas of the human body to solar radiation. The radiation area of the body in a variety of postures has been measured by a photographic technique and the results compared with those found earlier for the erect posture. Some of the implications of the results are mentioned and a nomogram is given which enables the direct radiation areas of the body to be quickly computed for a range of body size and solar altitude.

#### A67-82142

##### EFFECT OF REM SLEEP DEPRIVATION ON PSYCHOLOGICAL FUNCTIONING.

Stanley R. Clesmes (Mental Res. Inst., Palo Alto, Calif.) and William C. Dement (Stanford U., School of Med., Stanford Med. Center, Palo Alto, Calif.).

*Journal of Nervous and Mental Disease*, vol. 144, Jun. 1967, p. 485-491. 15 refs.

Grants PHS MH-08185 and PHS 1-K3-MH-5804.

Six male subjects, serving as their own controls, experienced six nights of REM deprivation and six nights of NREM deprivation. A battery of psychological tests was given after each of the experimental conditions. Evidence from projective tests showed an elevation in intensity of need and feeling and a depression of certain ego-controls as a result of REM deprivation.

#### A67-82143

##### THE NEURAL TRANSFORMATION OF MECHANICAL STIMULI DELIVERED TO THE MONKEY'S HAND.

Vernon B. Mountcastle, William H. Talbot, and Hans H. Kornhuber (Johns Hopkins U., School of Med., Dept. of Physiol., Baltimore, Md.).

IN: TOUCH, HEAT AND PAIN.

Edited by A. V. S. de Reuck and Julie Knight.

London, J. and A. Churchill Ltd., 1966, p. 325-351. 12 refs.

Contract USAFOSR 62-31A and Grant PHS NB 01045.

The slowly adapting myelinated fibers innervating the dermal ridges of the glabrous skin of the monkey's hand have been studied by an application of the method of single-unit analysis, with precise control of the mechanical stimuli applied and automatic data reduction and analysis. The response of such a first-order fiber to a stimulus of 0.5–1.0 sec. duration is a high-frequency onset discharge of impulses, which is determined by the velocity of skin indentation. The frequency of discharge falls rapidly thereafter to a quasi-steady state, during which there is a further but very slow decline in frequency. When the velocity of skin indentation is very great, the number of impulses in each successive period of the response, including the earliest, is an almost perfectly linear function of the intensity of the stimulus, up to 1,600–1,800  $\mu\text{m}$ . skin indentation. The stimulus-response functions tend to saturate with more intense stimuli, at which level tissue damage is threatened. When identical stimuli are delivered more rapidly than 6/min., successive responses contain successively fewer impulses until a stable response plateau is reached. This low-frequency depression effect is attributed to mechanical properties of the skin, in the main, rather than to a prolonged post-response change in nerve-ending excitability. Studies of the receptive fields of first-order fibers led to a reconstruction of the spatio-temporal profile of neural activity entering the central nervous system, evoked by a single stimulus delivered to a single locus, and to some speculations about the signalling of contour and position by a population of neurones. Treatment of the data from the standpoint of information theory led to the conclusion that a single primary afferent fiber can provide about three bits of information about the intensity of a single stimulus. The maximum rate of transmission of information on intensity has not yet been determined, but it is certainly no less than four-five bits/sec., and may be higher. Weber functions for the first-order fibers resemble those for mechanoreceptive sensibility in man, when the assumption is made that what is discriminable by the central nervous system is an absolute, not a fractional, increase in neural activity, an increase which is constant over the full response range.

**A67-82144****CUTANEOUS RECEPTORS WITH A HIGH SENSITIVITY TO MECHANICAL DISPLACEMENT.**

A. Iggo (Edinburgh U., Dept. of Vet. Physiol., Great Britain).

IN: TOUCH, HEAT AND PAIN.

Edited by A. V. S. de Reuck and Julie Knight.

London, J. and A. Churchill Ltd., 1966, p. 237–260. 26 refs.

The cutaneous mechanoreceptors innervated by the saphenous nerve in the hairy skin of the leg of the cat and rabbit have been examined using single-unit electrophysiological recording methods. A large sample (800), corrected for bias to the larger axons, of single units was examined. Five types of afferent units comprised 98% of the sample and fell into two main categories: (1) rapidly adapting mechanoreceptors; and (2) slowly adapting mechanoreceptors. The classes were Types D, G and T hair follicle afferent units, all of which were rapidly adapting, and Types I and II slowly adapting afferent units. The response characteristics of the various units were clear-cut and in some cases it has been possible to identify the appropriate receptor structure in the skin. The effect of cutaneous temperature on the mechanoreceptors was discussed briefly. There are large differences in the afferent innervation of various regions of the body surface, as well as species differences in the proportion of afferent units of various kinds of skin covering comparable parts of the body. Finally, the diameters of the afferent axons supplying the five categories of mechanoreceptors in hairy skin were compared.

**A67-82145****CLASSES OF RECEPTOR UNITS PREDOMINANTLY RELATED TO THERMAL STIMULI.**

Herbert Hensel (Marburg an der Lahn U., Physiol. Inst., West Germany).

IN: TOUCH, HEAT AND PAIN.

Edited by A. V. S. de Reuck and Julie Knight.

London, J. and A. Churchill Ltd., 1966, p. 275–290. 18 refs.

With respect to the discharge in the afferent fiber, a cold (warm) receptor can be defined as follows: (a) frequency rise (fall) on sudden cooling; (b) no response on sudden warming (cooling), if the fiber is silent, or inhibition of a resting discharge; (c) a steady discharge dependent on temperature; (d) no response to weak mechanical stimulation. The electrophysiological findings should be in agreement with behavioral responses, thermoregulatory reflexes, and with temperature sense in man. According to this definition, the following classes of nerve endings can be considered as thermoreceptors: (1) cold and warm receptors in the cat's and dog's tongue (A fibers); (2) cold receptors in the nose of the cat (A fibers); (3) cold receptors in human skin as well as in the skin of the monkey (A fibers); (4) cold and warm receptors in the external skin of the cat and dog (C fibers); (5) cold receptors in the trigeminal area of hibernating mammals (A and C fibers); and (6) infrared (warm) receptors in the pit organ of pit vipers (A fibers). The infrared receptors are mechanically sensitive but not accessible to mechanical stimuli under normal conditions. The steady discharge of single units in groups (1) to (4) has a maximum frequency of 2 to 15 impulses/sec. The temperature of the maximum discharge is between 38° and 43°C. for the warm fibers and between 15° and 34°C. for the cold fibers. Their dynamic sensitivity to sudden temperature changes is of the order of 30 to 50 impulses/sec.°C. On sudden changes, the maximum frequency reaches 150 impulses/sec. and more. In hibernating animals (5) the maximum of the steady discharge of cold receptors is at an average temperature of 4°C. The highest dynamic sensitivity of +2,000 impulses/sec.°C. is found in the infrared receptors (6) in pit vipers.

**A67-82146****ONLY ONE GAS OR TWO? [UN SEUL GAZ OU DEUX?]**

Youri Marinine.

*Science Progrès*, no. 3385, May 1967, p. 189–190. In French.

The hazards and the advantages of using oxygen as the only gas for breathing in the space cabin is discussed in light of the Apollo 204 accident and the accident in the test chamber at Texas. The use of a two-gas mixture is also discussed as to its advantages and relation to Russian developments.

**A67-82147****COMBINED ACTION OF CHLORPROMAZINE, ACETYLCHOLINE AND CATECHOLAMINES ON THE TEMPERATURE OF LIVER AND MUSCLE IN COLD-ACCLIMATIZED RATS [SKOJARZONE DZIALANIE CHLOROPROMAZYN, ACETYLOCHOLINY I KATECHOLAMIN NA CIEPŁOTE NARZĄDOW SZCZUROW AKLIMATYZOWANYCH W NISKIEJ TEMPERATURZE].**

Ryszard Molenda and Alfons Obrzut.

*Acta Physiologica Polonica*, vol. 18, Jul.–Aug. 1967, p. 587–594. 13 refs. In Polish.

Liver and muscle temperatures were studied in 160 rats. Eighty of the rats were exposed to a temperature of 4°C. for four wk. The investigated drugs were administered separately and together. Chlorpromazine decreased the intramuscular temperature of cold-acclimatized rats, but did not affect the liver temperature. The transient increase in the temperature of liver and muscle evoked by catecholamines was inhibited by chlorpromazine more in cold-acclimatized rats than in unacclimatized animals. Moreover, chlorpromazine increased the hypothermizing effect of acetylcholine and adrenaline on liver and muscular temperature of cold-acclimatized rats.

**A67-82148**

**INFLUENCE OF OXYGEN BREATHING UNDER INCREASED PRESSURE ON ACETYLCHOLINE ESTERASE AND MONOAMINOXIDASE ACTIVITIES IN THE BRAIN AND LIVER [WPŁYW ODDYCHANIA TLENEM POD ZWIEKSZONYM CIŚNIENIEM NA AKTYWNOŚĆ ESTERAZY ACETYLOCHOLINOWEJ I MONOAMINOOKSYDAZY MOZGOWIA I WĄTROBY].**

Władysław Świecicki, Zbigniew Jethon, and Stanisław Kurzepa.  
*Acta Physiologica Polonica*, vol. 18, Jul.-Aug. 1967, p. 607-612.  
20 refs. In Polish.

Constant respiratory hypertension, i.e., breathing with oxygen under increased pressure (20 mm.Hg) was applied for four min. in ten rabbits under urethane anesthesia (1.0 gm. per kg. body weight, in 10% aqueous solution). Ten rabbits under urethane anesthesia served as controls.

**A67-82149**

**ELECTROENCEPHALOGRAPHIC AND ENZYMATIC STUDIES ON THE ACTION OF PYRIDOXINE HYDROCHLORIDE ON BIOELECTRIC BRAIN ACTIVITY IN RABBITS POISONED WITH HYDRAZINE [BADANIA ELEKTROENCEFALOGRAFICZNE I ENZYMATYCZNE NAD DZIAŁANIEM OCHRONNYM CHLOROWODORKU PIRYDOKSYNY NA CZYNNOŚĆ BIOELEKTRYCZNĄ MOZGU KROLIKA ZATRUTEGO ZWIĄZKAMI HYDRAZYN].**

Zbigniew Edelwejn and Władysław Świecicki.  
*Acta Physiologica Polonica*, vol. 18, Jul.-Aug. 1967, p. 613-622.  
12 refs. In Polish.

The authors carried out a series of experimental investigations on the protective influence of vitamin B<sub>6</sub> in chronic poisoning with hydrazine sulfate. The experiments were performed in rabbits using electroencephalographic and biochemical methods. The results show that vitamin B<sub>6</sub> causes a marked reduction in the pathological changes observed in the electroencephalographic records and partially prevents the decrease in the glutathione levels in the blood and brain.

**A67-82150**

**CONTROL ELECTROENCEPHALOGRAPHIC STUDY OF FLYING PERSONNEL.**

Donald R. Bennett (Utah U., Coll. of Med., EEG Lab., Salt Lake City).  
*International Psychiatry Clinics*, vol. 4, Winter 1967, p. 23-35. 9 refs.

Recordings of the electroencephalograms of 1,332 flying personnel showed an 8% incidence in abnormalities. The aviators ranged in age from 18 to 55 yrs. The majority of the abnormalities were of the diffuse, mildly dysrhythmic type. Recordings showing spike-wave forms were found with a 0.6% frequency. The value of the electroencephalogram in saving time, money and lives in the selection of flying personnel and astronauts was discussed.

**A67-82151**

**PSYCHOPHYSIOLOGY OF AEROSPACE MEDICINE.**

George W. Barnard (Fla. U., Coll. of Med., J. Hillis Miller Health Center, Gainesville).  
*International Psychiatry Clinics*, vol. 4, Winter 1967, p. 3-22. 23 refs.

In analyzing the physiological data acquired during U.S. and Russian aerospace flights, stress and adaptation interpretations make the data more understandable. Physiological data obtained during flight have broadened the concept of "normality". Previous ideas of set limits for normality are inadequate. Altered physiological functions during flight are responses to stressors or to the

anticipation of stress and will return to previous baseline range once adaptation is obtained. A strong need exists for accumulating longitudinal data on many individuals so that individual variability may be better ascertained. There is a high level of interaction between subject and stress situation. Anticipation and stress periods introduce elements of stress response specificity in which the individuality of the subject is brought out. This concept argues for caution to be used in predicting operational responses on the basis of responses obtained in the laboratory setting. The anticipatory theme is a central concept in laboratory experiments and operational aerospace flights. The anticipatory effect can be partialled out from the stressor effect. Stress adaptation may be vitally linked with reduction in the anticipatory effect.

**A67-82152**

**THE USE OF NORMATIVE DATA IN THE PSYCHOLOGICAL EVALUATION OF FLYING PERSONNEL.**

Charles L. Jennings (USAF School of Aerospace Med., Psychiat. Branch, Clin. Psychol. Sect., San Antonio, Tex.)  
*International Psychiatry Clinics*, vol. 4, Winter 1967, p. 37-51.

Our data concluded that the typical Air Force flying officer is well suited to his job and performs very well. However, there were indications that he may be vulnerable to an increase in emotional stress that he is ill-equipped to handle due to his relative inflexibility and tendency to externalize. Problems will manifest themselves many times as somatic complaints, vague episodes of syncope, vertigo, increased irritability, tension, and even suspected fear of flying. Thus the psychological evaluation using the normative data as the starting point will assess the pervasiveness and intensity of the presenting problems and the recuperative powers of the individual, and attempt to determine whether the magnitude of the presenting problem is such that it will interfere with his functioning and the performance of his duties. These normative data point up and illustrate the primary fact that when one is concerned with high-level people who are highly skilled in the performance of their tasks and who have in most respects been subjected to the same type of training, the differences among them tend to be small and essentially unrevealing. In the evaluation of the individual patient, the psychologist must continually look to content analysis, the individual's approach, and the eccentricities of the behavior for a complete estimate of the structure; but his starting point is the normative data. With this frame of reference and his knowledge of the magnitude of deviation considered pathological, the psychologist will be able to predict more accurately the future behavior of the individual in question and to provide the psychiatrist with material that will aid him in his decision process on disposition.

**A67-82153**

**POSTGRADUATE PSYCHIATRIC TRAINING FOR FLIGHT SURGEONS.**

Samuel J. Brewer (6034th USAF Dispensary, San Francisco, Calif.)  
*International Psychiatry Clinics*, vol. 4, Winter 1967, p. 53-60.

Postgraduate education is a continuing process in all fields of study. The rapid advances in medical research today dictate that all physicians continue their education to the maximum extent. Continuing training in psychiatry is stressed for all flight medical officers and flight surgeons in the Air Force because of the dire consequences of emotional illness in military aviation. Ideally, in the Air Force we would like to have at each base a fully trained psychiatrist knowledgeable in all aspects of flight medicine. This would solve our problem of postgraduate education in psychiatry for the flight surgeons. The few fully trained psychiatrists we do have in the Air Force are placed in strategic locations to be available for consultation and assistance where needed. We are

continually amazed at the astuteness and professional ability of our young Air Force physicians trained in aviation medicine, and like to feel that the modest postgraduate education program in psychiatry discussed in this chapter has given them a better understanding of emotional illness in our flying population.

## A67-82154

**EMOTIONAL SUITABILITY FOR A FLYING CAREER.**

Alan L. Morgenstern (Ore. U., Med. School, Portland).

*International Psychiatry Clinics*, vol. 4, Winter 1967, p. 61-73. 10 refs.

The standards of emotional health discussed in this chapter will apply to the common and desirable situation of several applicants for each position. These standards have proven indispensable when selecting men for long careers in the cockpit. Criteria employed in day-by-day screening depend upon needs of commercial and military aviation and the supply of available manpower. In peacetime, for example, a college degree is considered essential, while high school graduation may suffice for a nation at war. When Britain was threatened in 1940, she was saved by the bravery and skill of Spitfire pilots barely past adolescence. Physicians offer sophisticated guidance in choosing men for pilot training, but selection ultimately depends on the vicissitudes of history.

## A67-82155

**INFLUENCE OF THE COMPOSITION OF ATMOSPHERIC AIR ON RESPIRATORY FUNCTION. EFFECT OF DEEP ANOXEMIC HYPOXIA ON THE MECHANICS OF BREATHING [WPŁYW SKŁADU POWIETRZA ATMOSFERYCZNEGO NA CZYNNOŚCI ODDECHOWE ODDZIAŁYWANIE GŁĘBOKIEJ HIPOKSJI ANOKSEMICZNEJ NA MECHANIKĘ ODDYCHANIA].**

Jerzy Lyszczyński and Maria Głogowska.

*Acta Physiologica Polonica*, vol. 18, Jul.-Aug. 1967, p. 573-581. 11 refs. In Polish.

Changes in the mechanics of breathing were estimated in anesthetized rabbits during and after breathing a gas mixture containing 7% oxygen. The results were confronted with the disturbances in gas exchange. During breathing of 7% oxygen, nonelastic resistance rose, while the compliance was unaltered. Immediately after inhalation was discontinued, nonelastic resistance fell below the control level, while the compliance increased. Later, a fall in the compliance and an increase in nonelastic resistance were observed. An interpretation of the results obtained is attempted.

## A67-82156

**EFFECT OF SEVERE EXERCISE ON LIVER AND SKELETAL MUSCLE AMINO NITROGEN DISTRIBUTION RATIO AND NONPROTEIN CONTENT IN RATS FED WITH DIETS OF DIFFERENT PROTEIN VALUES [WPŁYW WYTRZYMAŁOŚCIOWEGO WYSILKU FIZYCZNEGO NA ZMIANY AZOTU AMINOWEGO I POZABIAŁKOWEGO W WĄTROBIE I MIĘSIACH SZKIELETOWYCH PRZY STOSOWANIU DIET O RÓŻNEJ WARTOŚCI BIOLOGICZNEJ BIAŁKA].**

Ryszard Bernat, Zenon Jendykiewicz, and Lech Hryniewicz.

*Acta Physiologica Polonica*, vol. 18, Jul.-Aug. 1967, p. 565-572. 20 refs. In Polish.

An effect of severe exercise on liver and skeletal muscle amino nitrogen and non-protein nitrogen (NPN) content was investigated in 60 adult rats fed with isocaloric diets of different protein values. It was found that exercise induces changes in amino acid distribution ratios and NPN content only in rats fed with diets of adequate protein value, but not on protein-free diets. Plasma amino nitrogen levels decreased one hr. after exercise. However, this

decrement returned to normal values 24 hr. after exercise. At the same time, a significant increase in liver amino nitrogen distribution ratio was noted. Skeletal muscle distribution ratio rose not sooner than 24 hr. after exercise. Nonprotein nitrogen content of the investigated organs changed in parallel to the amino nitrogen changes. On the basis of this evidence, the authors assume that the action of exercise on amino acid distribution ratio may be referred to the effect on regulation mechanisms in which hormonal as well as nutritional factors are involved.

## A67-82157

**STUDIES ON THE INFLUENCE OF ACOUSTIC AND ULTRAACOUSTIC FIELDS ON BIOCHEMICAL PROCESSES. X. INFLUENCE ON LEVELS OF TOTAL PHOSPHORUS AND ITS FRACTIONS IN ORGANIC COMPOUNDS IN THE BLOOD OF GUINEA PIGS [BADANIA NAD WPŁYWEM POLA AKUSTYCZNEGO I ULTRAAKUSTYCZNEGO NA PROCESY BIOCHEMICZNE. X. WPŁYW NA POZIOM FOSFORU CAŁKOWITEGO I JEGO FRAKCJI W POLACZENIACH ORGANICZNYCH WE KRWI SWINEK MORSKICH].**

Krzysztof Krzaska.

*Acta Physiologica Polonica*, vol. 18, Jul.-Aug. 1967, p. 533-540. 27 refs. In Polish.

In the blood of guinea pigs exposed to prolonged action of acoustic and ultraacoustic fields, lowered levels of total, inorganic and acid-soluble phosphorus, fructose-1, 6-diphosphate, and ATP phosphorus were observed. On the other hand, levels of phosphorus bound with 2,3-diglyceric acid, phospholipid phosphorus, and Jaffe-positive substances were elevated. The observed blood changes failed to return to normal levels 14 days after cessation of the exposure.

## A67-82158

**ELECTROENCEPHALOGRAPHICAL AND MORPHOLOGICAL INVESTIGATION UPON THE INFLUENCE OF MICROWAVES ON THE CENTRAL NERVOUS SYSTEM [BADANIA ELEKTROENCEFALOGRAFICZNE I MORFOLOGICZNE NAD WPŁYWEM MIKROFALNA OSRODKOWY UKŁAD NERWOWY].**

Stanisław Barański and Zbigniew Edelwejn.

*Acta Physiologica Polonica*, vol. 18, Jul.-Aug. 1967, p. 517-532. 15 refs. In Polish.

The authors carried out a series of electroencephalographic and morphologic investigations upon the influence of microwave irradiation on the central nervous system. Male rabbits with screw electrodes inserted into the skull were used. These made possible the registration of bioelectric activity from premotor, sensory-motor and optic areas of the brain. The experiments were performed in two groups. In group I the animals were exposed to the influence of pulsed and continuous microwave field of 10-cm. and 3-cm. band by means of constant power density (5-7 mW./cm.<sup>2</sup>). The experiments lasted for 60 days (3 hours daily). In group II, it was observed that the influence of single irradiation using the pulsed and continuous waves of 10-cm. band, and 3-cm. band pulsed waves. The irradiation began at 5 mW./cm.<sup>2</sup> power density increasing the power gradually by 5 mW./cm.<sup>2</sup> up to 30 mW./cm.<sup>2</sup>. The results showed that the most distinct changes in the central nervous system were observed in both groups irradiated by means of 10 pulsed waves.

## A67-82159

**RENAL FUNCTIONAL TESTS AND MORPHOLOGICAL EXAMINATION OF KIDNEY IN DOGS DURING INTRAVENOUS INFUSION OF HYPERTONIC GLUCOSE AND MANNITOL SOLUTIONS [BADANIE CZYNNOSCI I STRUKTURY NEREK U PSOW PODCZAS DOZYLNEGO WLEWANIA HIPERTONICZNYCH ROZTWOROW GLUKOZY I MANNITOLU].**

Krystyna Weiss-Zielezinska.

*Acta Physiologica Polonica*, vol. 17, May-Jun. 1967, p. 391-401. 18 refs. In Polish.

In 15 mongrel dogs inulin and paraaminohippurate clearances were determined during moderate (5.6 ml./min.) and rapid infusion of 20% glucose and 15% mannitol solutions. The ureter was clamped twice during moderate and rapid diuresis. Arterial and venous blood pressure, as well as the filtration pressure, were recorded during these experiments. Specimens of renal tissue for microscopic examinations were obtained directly before the onset and twice during the course of the experiments. A moderate increase in inulin and para-aminohippurate clearances was found following increase of the rate of infusion of hypertonic solutions. The arterial blood pressure increased more significantly during mannitol infusions. A filtration pressure corresponding to 70% of arterial pressure was found in dogs given intravenously mannitol and glucose solutions. Microscopic examination of renal tissue obtained during osmotic diuresis revealed distended lumina of tubules, flattened renal epithelial cells, and homogeneous masses in the nephrons. No degenerative changes were found. The results are discussed in connection with the use of osmotic diuresis in stop-flow experiments.

## A67-82160

**INFLUENCE OF ACETYLCHOLINE AND PHYSOSTIGMINE ON RENAL FUNCTION [CZYNNOSC NEREK PO INIEKCJI ACETYLCHOLINY I FIZOSTYGMINY].**

Marian Pytasz, Maria Tyburczyk, and Marian Wislinski.

*Acta Physiologica Polonica*, vol. 17, May-Jun. 1967, p. 377-389. 17 refs. In Polish.

Clearance and stop-flow experiments were performed in dogs to study renal function after administration of acetylcholine (ACh) and physostigmine (F). Both substances were given in continuous infusions in doses: ACh-2-20 µg./kg./min., and F-6-16 µg./kg./min., after a previous single dose of 15-30 µg./kg. Excretion of the following substances was studied: endogenous creatinine, para-aminohippuric acid (PAH), phosphates, sodium and potassium. Acetylcholine slightly decreased diuresis, filtration and reabsorption. Excretion of sodium, potassium and PAH was unchanged, while excretion of phosphates decreased markedly, by about one-third. In some of the stop-flow experiments, ACh increased secretion of PAH in the proximal tubules. Excretion of potassium in the distal tubules was always increased. After physostigmine, despite somewhat diminished diuresis, excretion of all the studied substances, except sodium, was increased. In preliminary experiments acetylcholine and physostigmine increased metabolism in the kidneys. Addition of one of these substances to the incubation medium increased oxygen consumption by slices of rabbit kidney. On the basis of these experimental findings, the possibility of cholinergic innervation in the kidneys influencing not only metabolism but also vascular reactions, is discussed.

## A67-82161

**EFFECT OF A SEVERE EXERCISE ON DISTRIBUTION OF LIVER AND SKELETAL MUSCLE PROTEIN AND NUCLEIC ACIDS IN RATS FED WITH DIETS OF DIFFERENT PROTEIN VALUES [WPLYW WYTRZYMALOSCOWEGO WYSILKU FIZYCZNEGO NA ROZMIESZCZENIE BIALEK I Kwasów NUKLEINOWYCH W WATROBIE I MIĘSNIACH SZKIELETOWYCH PRZY STOSOWANIU DIETY O RÓŻNEJ WARTOŚCI BIOLOGICZNEJ BIAŁKA].**

Lech Hryniewiecki, Ryszard Bernat, and Zenon Jendykiewicz.

*Acta Physiologica Polonica*, vol. 17, May-Jun. 1967, p. 349-360. 29 refs. In Polish.

Experiments were done on 60 adult rats divided into two equal groups which had been previously kept in a state of decreased mobility and fed 48 days with either a diet of high protein value or a protein-free diet. All the animals except control subgroups, were run for an hr. on the treadmill rotating with a speed of 15 r.p.m., thus covering a distance of 1825 m. It was found that severe exercise brought about some changes in distribution of liver proteins and liver and skeletal muscle ribonucleic acids but not of deoxyribonucleic acids. These alterations were observed exclusively in animals which prior to the exercise had been fed with a diet of high protein value. The authors suggest that severe exercise might induce an impairment of protein homeostasis in rats not previously preconditioned. Adequate supply of indispensable amino acids in food seems to be a limiting factor underlying this derangement. Possible role of labile protein in response of protein metabolism to exercise is also discussed.

## A67-82162

**PLASMINOGEN ACTIVATOR DURING AND AFTER MUSCULAR EXERCISE [AKTYWATOR PLAZMINOGENU W CZASIE I PO OBCIĄŻENIU PRACĄ].**

Tadeusz Januszko, Henryk Reutt, Michał Malofiejew, and Karol Buluk.

*Acta Physiologica Polonica*, vol. 17, May-Jun. 1967, p. 339-347. 24 refs. In Polish.

It has been found that muscular exercise causes an increase in the plasminogen activator in the blood which is proportional to the working load. The increase in the activator after muscular exercise is less in the trained group than in the group unaccustomed to physical effort. It was found that *in vivo* the time required for the disappearance of 50% of the activator increases after muscular exercise of 15,000 kg. on the average, 43 min.

## A67-82163

**INHIBITION OF SHIVERING OBTAINED BY PERIPHERAL STIMULATION.**

L. D'Anna (Buenos Aires U., Fac. de Med., Inst. de Fisiol., Argentina).

*Experientia*, vol. 23, Aug. 15, 1967, p. 638-639.

Consejo Nacl. de Invest. Cient. y Téc., Argentina and Brit. Council supported research.

The possibility that peripheral skin stimulation could inhibit shivering was investigated in nine dogs anesthetized with nembutal. Shivering was detected by electromyographic (EMG) activity registered from the extensor and flexor muscles of one leg. Results indicated that peripheral stimulation inhibited EMG activity produced by shivering and influenced both flexor and extensor muscles. It was suggested that the inhibition of shivering could be an inhibitory process set up by afferent inputs on the hypothalamus or the reticular formation.

## A67-82164

**CIRCADIAN RHYTHMICITY OF SOME KEY METABOLITES IN THE FASTED AND FED WEANLING FEMALE RAT.**

M. S. Bahorsky and L. L. Bernardis (N. Y. State U., Dept. of Pathol. and Neurosensory Lab., Buffalo).

*Experientia*, vol. 23, Aug. 15, 1967, p. 634-635. 7 refs.

Grant NHI HE 06975.

Circadian fluctuations were observed in several key metabolites in fasted and fed weanling female rats. Serum and plasma determinations were obtained for inorganic phosphorus, glucose, urea nitrogen, total protein, sodium and potassium. Significant diurnal

fluctuations were reported in some, but not all the metabolites. Some fluctuations occurred in fed rats which did not occur in fasted rats. Endocrine secretions may be dependent on nervous and neuroendocrine agents which seem to be subject to circadian rhythmicity.

**A67-82165****OXYGEN THERAPY.**

J. Hedley-Whyte and P. M. Winter (Harvard Med. School, Mass. Gen. and Beth Israel Hosps., Boston, Mass.).

*Clinical Pharmacology and Therapeutics*, vol. 8, Sep.-Oct. 1967, p. 696-737. 237 refs.

Grants PHS HE 08558, PHS HE 05422-09, PHS FR-05175-05, and PHS 5 T01-GM-1273-03.

Measurements of abnormalities in the interrelationship of pulmonary ventilation and perfusion have become common in oxygen therapy. The techniques by which these measurements are now made and their value in guiding oxygen therapy are discussed. Each phase of oxygen transport to the tissues can be influenced by properly regulated oxygen therapy. Oxygen is a poison when given in too high a dose. Pulmonary oxygen toxicity occurs at tensions well below one atmosphere, and at higher tensions almost every cell in the body is affected. The results of hyperbaric oxygen therapy are frequently questionable, and the physiologic rationale often obscure; however, hyperbaric treatment, when properly regulated, will probably continue to have therapeutic application. Likely areas of usefulness for hyperbaric medicine are outlined.

**A67-82168****PSYCHOLOGIC, PHYSIOLOGIC, ENVIRONMENTAL AND OTHER CONSIDERATIONS FOR PASSENGER FLYING.**

B. B. Dotto.

*Medicine and Surgery*, vol. 7, Jan. 1967, p. 9-17.

The rapidly increasing number of persons traveling by air naturally includes persons having various types and degrees of clinical disorders. When a patient or invalid is under consideration for air travel, certain basic medical and surgical points must be considered. Travel by air was found to be desirable and safe for patients with certain types of illness. Only a small percentage are not acceptable on purely medical grounds.

**A67-82169****EEG-INVESTIGATIONS ON THE INFLUENCE OF CHRONIC HYDRAZINE INTOXICATION ON BIOELECTRICAL BRAIN ACTIVITY IN RABBIT [BADANIA ENCEFALOGRAFICZNE NAD WPŁYWEM PRZEWLEKŁEGO ZATRUCIA ZWIĄZKAMI HYDRAZYN NA CZYNNOSC BIOELEKTRYCZNA MOZGU KROLIKA].**

Zbigniew Edelwejn.

*Acta Physiologica Polonica*, vol. 18, Jan.-Feb. 1967, p. 97-105. 7 refs. In Polish.

Investigations were carried out studying the influence of chronic intoxication with a hydrazine-sulfate-water solution upon the bioelectric brain activity. The investigations were performed in rabbits with implanted cortical electrodes. Electroencephalographic and histologic methods were used. The findings showed that hydrazine sulfate administered chronically caused changes in electroencephalographic records, suggesting a decrease of the cortex convulsive excitability threshold and the appearance of changes evidencing a lesion in brain, most frequently in the sensory-optical region. Histological examinations showed the presence of colliquative necrotic foci at the border of the cortex and white substance in the optical region.

**A67-82170****INVESTIGATION OF TOXOGONIN ON THE BIOELECTRICAL ACTIVITY CHANGES IN RABBIT BRAIN INTOXICATED BY SARIN [BADANIA WPŁYWU TOKSOGONINY NA ZMIANY CZYNNOSCI BIOELEKTRYCZNEJ W MOZGU KROLIKA ZATRUTEGO SARINEM].**

Zbigniew Edelwejn and Sławomir Rump.

*Acta Physiologica Polonica*, vol. 18, Jan.-Feb. 1967, p. 81-88. 13 refs. In Polish.

The authors have carried out a series of investigations on the effect of toxogonin upon bioelectrical phenomena in the rabbit brain intoxicated with sarin. The studies were carried out in two groups, each including eight animals. In the first group, bioelectrical activity of the resting brain was registered after an intravenous injection of sarin (20 gamma/kg.) and after administration of toxogonin (50 mg./kg.) in the tenth min. of the experiment. In the second group, identical experiments were performed after previously curarizing the animals. The authors suppose that the interruption of spike activity caused by high doses of sarin may be taken as a sign suggesting the possibility of toxogonin activity in the central nervous system.

**A67-82171****STUDIES ON THE PHENOMENON OF FATIGUE OF CONDITIONED REFLEXES. IV. THE INFLUENCE OF CHLORPROMAZINE, RESERPINE AND AMPHETAMINE ON FATIGUE OF CONDITIONED REFLEXES [BADANIA NAD ZJAWISKIEM ZNUZENIA ODRUCHOW WARUNKOWYCH. IV. WPŁYW CHLORPROMAZYNY, REZERPINY I AMFETAMINY NA NUZENIE SIE ODRUCHOW WARUNKOWYCH].**

Jerzy Cytawa.

*Acta Physiologica Polonica*, vol. 18, Jan.-Feb. 1967, p. 155-170. 50 refs. In Polish.

An attempt was made to localize fatigue of conditioned reflexes in the central nervous system pharmacologically. Fatigue of conditioned reflexes under the influence of chlorpromazine (2.5 mg./kg.) reserpine (1.0 mg./kg.) and amphetamine (2.5 mg./kg) was studied. Experiments were performed with ten white rats by the technique of alimentary motor conditioned reflexes. The conditioned stimulus was a bell, and reinforcement consisted of a bread ball with minimal weight 0.02-0.07 gm. preventing rapid satiation. With each of the studied drugs, and with physiologic solution 30 experiments were performed, consisting of 120 exposures to the conditioned stimulus. The behavior of the indexes of latency and magnitude of the reaction were analyzed. Conclusions were outlined and discussed in detail.

**A67-82172****LUNG FUNCTION STUDIES IN HEALTHY MEN AND WOMEN OVER FORTY.**

S. K. Jain and C. K. Gupta (Delhi U., Vallabhbbhai Patel Chest Inst., India).

*Indian Journal of Medical Research*, vol. 55, Jun. 1967, p. 612-619. 18 refs.

Data on static lung volumes and the mechanics of breathing in 83 healthy men and 34 women 41 to 65 yrs. old were presented. The mean values, standard errors of mean and coefficients of variation for all parameters were given. Important differences between men and women for different lung functions were discussed. In women, the values for all the lung function tests were significantly lower than men. Aging seemed to produce: (1) a reduction of (vital capacity, total lung capacity, expiratory reserve volume, maximum voluntary ventilation, forced expiratory volume) percent and expiratory flow rates; (2) little change in functional residual capacity; (3) an upward trend in residual volume and (4)

an increase in residual volume/total lung capacity ratio. In both sexes, these changes were more pronounced after the age of 50 yrs. The possible mechanisms involved were discussed. Little agreement was found between the present results and the results of other Indian workers. The results obtained were also compared with those of some foreign authors.

#### A67-82173

#### AGE, HEIGHT AND BODY WEIGHT AS DETERMINANTS OF VENTILATORY 'NORMS' IN HEALTHY MEN ABOVE FORTY YEARS AGE.

S. K. Jain and C. K. Gupta (Delhi U., Vallabhbhai Patel Chest Inst., India).

*Indian Journal of Medical Research*, vol. 55, Jun. 1967, p. 599-611. 12 refs.

Data on lung volumes and the mechanics of breathing in 70 healthy men between 40 and 65 yrs. of age were statistically analyzed. Coefficients of regression of different lung functions over age, height and weight were determined. Regression equations or prediction formulae were worked out to permit prediction of lung function values from age, height and weight of a given healthy man. Values of sample standard deviations from regression were given for each lung function. Regression equations of other workers were compared with those of present study. Tables showing the predicted normal values of important lung functions for different ages, heights and weights were included in an appendix.

#### A67-82174

#### VOLUME RESTORING INFLUENCE OF THE ELECTRICALLY INDUCED CARDIAC ACCELERATION OF THE PLASMA VOLUME OF THE COOLED DOGS.

S. B. Shukla and J. Nagchaudhuri (Banaras Hindu U., Coll. of Med. Sci., Dept. of Physiol., Varanasi, India).

*Indian Journal of Medical Research*, vol. 55, Jun. 1967, p. 584-590. 19 refs.

Seven healthy mongrel dogs were subjected to hypothermia at 25°C., and arterial pressure, heart rate and plasma volume were measured in each dog. The cardiac acceleration in each cooled dog was done by external pacemaking using an electrical stimulator. The arterial pressure, heart rate and plasma volume decreased during cooling. The cardiac acceleration induced an increase in the arterial pressure and the plasma volume. Comparatively smaller decreases in the plasma volume during cooling corresponded with complete recovery of the plasma volume and vice versa. This relationship was probably due to a cessation of flow in comparatively smaller areas of the capillary bed and vice versa. The pressure-driven mobilization of the plasma during pacemaking suggested that the fall of pressure due to the marked bradycardia was probably responsible for the sequestration of plasma under hypothermia.

#### A67-82175

#### THE RESPIRATORY METABOLISM OF THE SHERPAS (HILL-PEOPLE) DURING CLIMBING: A STUDY OF SIXTY SIX CASES OF NORMAL HEALTHY ADULTS.

S. K. Das and H. Saha (Nilratan Sircar Med. Coll., Calcutta, India). *Indian Journal of Medical Research*, vol. 55, Jun. 1967, p. 579-583. 8 refs.

Sixty six subjects climbed a 20% grade on a treadmill at a speed of 3.22 km./hr. with a load of 16 kg. The values of respiratory metabolism of the subjects during rest and climbing were noted and analyzed statistically. It was seen that the mean values of pulmonary ventilation corrected to S.T.P.D., and the energy expenditure of the Sherpas during rest did not differ from

those living in the plains. During climbing, the Sherpas were found to be more efficient than those living in the plains. From the result of statistical analysis of the data, a combined regression equation was computed by which it was possible to predict the energy expenditure of a subject from his age, height and weight. The relationship between age, height and weight on the energy expenditure was evaluated and it was seen that the correlation between weight and energy expenditure was significant at 1% both at rest and during work. The next important factor which determined energy expenditure was height. Within the range of age investigated, age had no significant effect on energy expenditure.

#### A67-82176

#### THE ASSESSMENT OF THE AMOUNT OF FAT IN THE HUMAN BODY FROM MEASUREMENTS OF SKINFOLD THICKNESS.

J. V. G. A. Durnin and M. M. Rahaman (Glasgow U., Inst. of Physiol., Great Britain).

*British Journal of Nutrition*, vol. 21, no. 3, 1967, p. 681-689. 21 refs.

Grant PHS AM 05104.

Skinfold thickness and body density were measured on 105 young adult men and women and 86 adolescent boys and girls. The correlation coefficients between the skinfold thicknesses, either single or multiple, and density were in the region of -0.80. Regression equations were calculated to predict body fat from skinfolds with an error of about  $\pm 3.5\%$ . A table gives the percentage of the body-weight as fat from the measurement of skinfold thickness.

#### A67-82177

#### VITAMIN E AND STRESS. 5. THE EFFECT OF HIGH AND LOW OXYGEN TENSION ON THE METABOLISM OF [ $^{14}\text{C}$ ]D- $\alpha$ -TOCOPHEROL IN THE VITAMIN E-DEFICIENT RAT.

M. A. Cawthorne, A. T. Diplock, I. R. Muthy, J. Bunyan, Elspeth A. Murrell, and J. Green (Vitamins Ltd., Walton Oaks Exptl. Sta., Surrey, Great Britain).

*British Journal of Nutrition*, vol. 21, no. 3, 1967, p. 671-679. 22 refs.

Vitamin E-deficient rats were found to be more susceptible than vitamin E-supplemented controls to the toxic effects of hyperbaric oxygen (60 lb./in.<sup>2</sup> for 20 min.). This agrees with the findings of other workers. Hyperbaric O<sub>2</sub> treatment did not increase the metabolic destruction of a small amount (46.65  $\mu\text{g}$ .) of [ $^{14}\text{C}$ -5-Me]D- $\alpha$ -tocopherol given to adult vitamin E-deficient rats 24 hr. previously. The O<sub>2</sub> treatment also did not affect the soluble sulphhydryl compounds and ascorbic acid of rat liver, nor the percentage hemolysis in vivo of rat blood. Hyperbaric O<sub>2</sub> treatment did not increase the true lipid peroxide content of rat brain, compared to control rats treated with hyperbaric air, which has no toxic effects. Increases in "lipid peroxidation" reported by previous workers are considered to have been due to the use of inadequate controls (untreated rats) and of in vitro techniques that are open to criticism. The toxic effects of hyperbaric O<sub>2</sub> in the vitamin E-deficient rat cannot be attributed to peroxidation in vivo. Vitamin E was not found to protect rats against the effects of reduced O<sub>2</sub> tension (anoxic anoxia). This finding contrasts with some reports by earlier workers. Reduced O<sub>2</sub> tension had no effect on the metabolism of radioactive tocopherol, on blood hemolysis in vivo, or on the soluble sulphhydryl compounds and ascorbic acid of liver.

#### A67-82178

#### THE EFFECT OF RAISED METABOLITE CONCENTRATION IN MUSCLES ON VENTILATION [DIE WIRKUNG ERHOHTER METABOLITKONZENTRATIONEN IM MUSKEL AUF DIE VENTILATION].

**A67-82179**

Jürgen Stegemann and Dieter Böning (Cologne U., Inst. for Normal and Pathol. Physiol., West Germany). *Pflügers Archiv für die gesamte Physiologie*, vol. 294, 1967, p. 214-222. 14 refs. In German.

Experiments were performed on humans to find out whether ventilation is controlled by mechano- or chemoreceptors in the muscles. Therefore ventilation, endtidal CO<sub>2</sub> pressure (pCO<sub>2</sub>) and the acid-base status of the arterial blood were determined together with some circulatory parameters before, during and after blocking of the blood flow in both legs. When the blood flow was blocked at rest, heart rate and blood pressure increased, while ventilation remained rather constant. If in the initial state of the occlusion an exercise of 120 to 1,200 mkp was performed within a short time, heart rate, blood pressure and ventilation increased in the post-exercise period, while the endtidal pCO<sub>2</sub> was decreased. These effects are demonstrating that hyperventilation during exercise does not result from the motion of the muscles themselves, but is correlated to their metabolic status. Circulation is stimulated by occlusion of the blood flow; ventilation however increases only if an initial exercise is added. From this it follows that the same chemoreceptors may stimulate both the centers for ventilation and circulation but the threshold seems to be higher for the respiratory than for the circulatory response.

**A67-82179****IMPONDERABLES OF ISOLATION.**

Don T. Mosher (Georgetown U., School of Med., Washington, D. C.) *International Psychiatry Clinics*, vol. 4, Winter 1967, p. 223-230. 24 refs.

Some of the problems in the study of social isolation are discussed. Confusion with other studies such as sensory deprivation, cultural isolation, etc. is pointed out. Difficulties in research methods, lack of evidence from animal investigations and the use of subjective reports by the isolate are reviewed.

**A67-82180****PSYCHIATRIC SUPPORT FOR MAN IN SPACE.**

Carlos J. G. Perry (USAF School of Aerospace Med., Brooks AFB, Tex.) *International Psychiatry Clinics*, vol. 4, Winter 1967, p. 197-221. 15 refs.

A review is presented of the clinical area of psychiatric activity in the space program with the object to define the sphere of space medicine in which the talents of the clinical psychiatrist may best be used. These activities are discussed in relation to psychological evaluations of astronauts for Project Mercury and the Apollo Program. Evaluations of candidates for MOL and selection of the scientist-astronauts and crew members for future missions are important to determine motivation and possible pathological overtones. Mission support would include roles of psychiatric care of the astronaut during training and aid in research on human subjects. If psychiatric support is effectively used greater success in the medical aspects of space flight can be assured.

**A67-82181****PSYCHOLOGICAL FACTORS IN FLYING FATIGUE.**

Bryce O. Hartman (USAF School of Aerospace Med., Biodyn. Branch, Psychobiol. Sect., Brooks AFB, Tex.) *International Psychiatry Clinics*, vol. 4, Winter 1967, p. 185-196.

A discussion was presented of the aspects of flight fatigue which are of specific importance to the flight surgeon. Although a definitive definition of fatigue was not stated, terms such as cumulative fatigue, acute fatigue and chronic fatigue were discussed in relation to their biological bases. Subjective effects and their

role in acute and cumulative fatigue were shown to have an importance in the everyday flight routine. Diurnal cycle effects, metabolic clocks, and work-rest cycle effects were reviewed in relation to flight fatigue.

**A67-82182****EMOTIONAL FACTORS IN AIRCRAFT ACCIDENTS.**

Roger F. Reinhardt (U.S. Naval Aerospace Med. Inst., Div. of Psychiat. and Neurol., Pensacola, Fla.)

*International Psychiatry Clinics*, vol. 4, Winter 1967, p. 177-184.

The causes of accident-proneness are likely to be as diverse as those of schizophrenia. As not all schizophrenic illnesses can be predicted or prevented, it is not likely that all people moving into accident syndromes can be diagnosed or their progression stopped. It seems most helpful to think of accident proneness in aviation as an illness form which shares some psychodynamic mechanisms with depression, suicide, aggressive behavior, psychosomatic illnesses, and personality disorders. Psychiatry can probably contribute most by a continuing intensive study of individual patients who seems bent on destruction by aircraft accident.

**A67-82183****PSYCHODYNAMIC RELATIONSHIPS: SUICIDE AND FLYING PHOBIA.**

Paul F. Eggertsen (USAF Hosp. Travis, Dept. of Psychiat., Travis AFB, Calif.)

*International Psychiatry Clinics*, vol. 4, Winter 1967, p. 155-175. 7 refs.

An attempt is made to define the psychoanalytic and existential dynamics in order to establish the basis for flight phobia. The hypothesis is that suicide is strongly related to phobias of flight. In assessing the risk the physician must look for a syndrome combining in the aviator the symptoms of depression, schizophrenia, emotional instability, lack of personal relationships, socially disruptive and a lack of the sense of future. Flying status is equated with suicide risk.

**A67-82184****PHOBIC REACTIONS TO FLYING.**

Alan L. Morgenstern (Ore. U., Med. School, Portland).

*International Psychiatry Clinics*, vol. 4, Winter 1967, p. 141-154. 5 refs.

Many men who could be treated and get back to flying are never afforded proper care. Adventitious guilt and shame secondary to the neurosis keep some from treatment. Others fear that revealing symptoms will lead to permanent grounding or charges of dereliction of duty. Pilots usually view their employers as impersonal leviathans who find it easier to say "no" than "yes"; they are often correct in this appraisal, for it is one thing to cure a man and quite another to convince his employers that he is cured. Hiding symptoms or seeking treatment in secrecy are consequences of policies that seek to improve flying safety but may paradoxically endanger it. The solution to this problem will be found in enlightened use of mental health specialists by pilots and administrators aware of the therapeutic efficacy of contemporary psychiatry.

**A67-82185****CLINICAL ASPECTS OF PSYCHIATRIC ILLNESS IN FLYERS.**

John C. Sparks (Wilford Hall USAF Hosp., Dept. of Psychiat., Psychiat. Serv., San Antonio, Tex.)

*International Psychiatry Clinics*, vol. 4, Winter 1967, p. 133-139.

Various clinical aspects of psychiatric illness in flyers as seen in a hospital setting have been discussed. If a psychiatrist

were to describe the patients seen by the flight surgeon on an active flying base, it is probable that most of the presenting clinical symptoms could have been treated at that time by immediate intervention; by encouraging the patient to ventilate or deal with a consciously noted problem, or modify his behavior. Immediate intervention, as soon as the patient's problem is recognized, will probably decrease the length of symptoms. This should be encouraged in those who deal with flying personnel. Rapid evaluation and short-term therapy can be used much more frequently with flyers than with any other military group. They are the ones who have been most thoroughly trained to adapt, accept direction, and work out solutions. As a result, as noted at the beginning of this article, their responses are much more frequently neurotic. Their recovery from illness seems directly related to their previous ability to adapt to new situations, their ability to accept instructions, and the time lag before onset of conscious attempts to deal with their emotional problems.

#### A67-82186

##### AVIATION PSYCHIATRY AND THE NAVY SPECIAL BOARD OF FLIGHT SURGEONS.

Roger F. Reinhardt and Norman B. Clarke (U.S. Naval Aerospace Med. Inst., Pensacola, Fla.)

*International Psychiatry Clinics*, vol. 4, Winter 1967, p. 121-131.

A review was presented of psychiatric cases coming before the U.S. Navy's Special Board of Flight Surgeons. Forty-one cases were discussed. Clinical findings were analyzed in relation to the military situation, and the intent has been to drop undesirables while retaining as many pilots as possible. At the same time an effort has been made to reduce the stigma of a diagnosis of emotional impairment. While only 2% of the cases were termed psychotic, 19% were returned to unrestricted flying and 5% were restricted to noncarrier aviation. Six illustrative cases were given.

#### A67-82187

##### DAEDALUS AND ICARUS REVISITED: INTERPERSONAL ASPECTS OF FLIGHT INSTRUCTION.

Gary J. Tucker (Yale U., School of Med., New Haven, Conn.)

*International Psychiatry Clinics*, vol. 4, Winter 1967, p. 101-120.

In this paper we have tried to delineate some of the problems which seem unique to the airborne environment. It has been emphasized that, especially for the student, the unfamiliarity of the instruction and intense interpersonal relationship, combined with the newness of the aerospace—with its feeling of "other-worldliness"—allow for intense and often out-of-proportion, as well as misdirected, emotional responses. The analogy has been made between flight instruction and psychotherapy, which seems valid and applicable. The problems of the students have been divided into three main areas: (1) the problems of identification; (2) the problems of transference of parataxic distortion; and (3) the oedipal conflicts. The problems of the instructor have been noted and seem to be of a less severe nature than those experienced by the student. The problems of instructor fatigue have been noted, as well as the specific types of parataxic distortions, or countertransference problems. It is extremely important for psychiatrists, medical personnel, and even experienced aviators who may be evaluating students to be aware of the particular pitfalls of the instructional relationship. If viewed as interpersonal relationships, many of the problems which might be interpreted as fear of flying, or lack of motivation, may be delineated and cured. Since teaching in aviation continues throughout an aviator's career (due to the complexity and constant introduction of new techniques and instruments), this instruction, with its particular interpersonal connotations, becomes even more important, and its understanding crucial.

#### A67-82188

##### PSYCHIATRIC CONSULTATIONS AND CIVIL AVIATION MEDICINE.

H. C. Haynes (Georgetown U., Med. School, Washington, D. C.). *International Psychiatry Clinics*, vol. 4, Winter 1967, p. 81-99, 8 refs.

This article is devoted to the psychiatric consultation report in civil aviation. The first section provides a background in governmental rules and administrative and procedural matters: the requirements for an airman's medical certificate are summarized; the Aviation Medical Examiner program is outlined; the form used to record the medical examination is described and major sources of psychiatric referrals are discussed; a brief history of the development of present psychiatric standards is presented; the medical regulation for psychiatric standards is quoted in its entirety; and the appeal procedures available to the airman denied medical certification are described step by step. The second section is devoted to the special clinical and ethical problems encountered by the psychiatrist who submits a consultation for use in aeromedical certification. Excerpts from reports are used for illustrative purposes. The value of psychological testing is discussed. Salient points which contribute to the aeromedical psychiatric report are mentioned. A syndrome seen in senior commercial pilots is presented.

#### A67-82189

##### BEHAVIOR OF IONIZED AND TOTAL CALCIUM IN THE BLOOD SERUM AFTER PHYSICAL EFFORT [ZACHOWANIE SIE WAPNIA ZJONIZOWANEGO I CAŁKOWITEGO W SUROWICY KRWI PO WYSILKU FIZYCZNYM].

Zuzanna Araszkiewicz and Tadeusz Kubaj.

*Acta Physiologica Polonica*, vol. 18, Jan.-Feb. 1967, p. 53-63, 20 refs. In Polish.

Ionized and total calcium, total protein and hematocrit indexes were determined in nine young male subjects after physical work with a load of 810 kg./min. for a period of 30 min. Blood samples were obtained four times: before work, immediately after its termination, and after one and two hr. rest. A drop in the concentration of ionized calcium and a rise in total calcium, accompanied by a drop in protein and hematocrit were observed. It was concluded that the drop in ionized calcium is associated with a change in plasma concentration. Elucidation of the reason for the rise in total calcium concentration will require further research. Statistical significance of the experimental observations was confirmed.

#### A67-82190

##### BEHAVIOR OF PANTOTHENIC ACID IN THE TISSUES AND BLOOD IN WHITE RATS AFTER BRIEF AND LONG-LASTING PHYSICAL EXERCISE [ZACHOWANIE SIE KWASU PANTOTENOWEGO W TKANKACH I KRWI U BIAŁYCH SZCZUROW PO KROTOKO- I DŁUGOTRWALYM WYSILKU FIZYCZNYM].

Mieczysław Bialecki and Feliks Nijakowski.

*Acta Physiologica Polonica*, vol. 18, Jan.-Feb. 1967, p. 33-38, 11 refs. In Polish.

Concentrations of pantothenic acid were estimated by the microbiologic method in the tissues and blood of rats after brief and long-lasting physical exercise. The daily diet of the rats contained about 35 µg. of pantothenic acid. A statistically significant decrease in the concentration of pantothenic acid was observed in the kidneys after physical exercise lasting 5 hr. and continued to decline after physical exercise of ten days and one mo. In the skeletal muscles, myocardium, and blood, concentrations of pantothenic acid diminished only after physical exercise lasting ten days, and continued to drop after one month's exercise. In the liver, pantothenic acid concentrations were not decreased until after physical exercise lasting one month.

**A67-82191****INDEX FOR EVALUATION OF PHYSIOLOGIC HEAT STRESS [INDEX FOR BEDOMNING AV FYSIOLOGISK VARMEBELASTNING].**

Börje E. Löfstedt (Lund U., Inst. för Hyg., Sweden).

*Nordisk Hygienisk Tidskrift*, vol. 48, no. 1, 1967, p. 1-7. 9 refs. In Swedish.

A comparison between mean body temperature increase ( $\Delta T_m$ ), sweat rate, and the Climatic Stress Index of previous workers was made. It appeared that the original index,  $100 \cdot E_{req}/E_{max}$  even in its modified form was inaccurate in comparing dry and humid climates. The linear difference,  $E_{max} - E_{req}$  however, gave nearly as good a linear correlation to physiological reactions as the P4SR index.

**A67-82192****A TELEPEDOMETER FOR THE REMOTE MEASUREMENT OF HUMAN LOCOMOTOR ACTIVITY.**

R. E. Herron and R. W. Ramsden (Alder Zone Center, Champaign, Ill.).

*Psychophysiology*, vol. 4, Jul. 1967, p. 112-115.

Ill. Dept. of Mental Health supported research.

A short-range, inexpensive, transmitter-transducer has been designed for installation inside the heel of a shoe. It provides a means of monitoring foot contact with the ground and can be used to obtain information about "natural" patterns of daily physical activity. Its unobtrusiveness serves to reduce or, as in studies of children, to eliminate artifacts due to the subject's awareness that he is under study. Tests indicate that the device is quite durable, stable and reliable. It may be installed and remain in the heel of a shoe, unknown to the wearer, for a matter of days.

**A67-82193****EFFECT OF INCREASES AND DECREASES IN BREATHING RATE ON HEART RATE AND FINGER PULSE VOLUME.**

Bernard T. Engel and Ray A. Chism (Calif. U., San Francisco Med. Center, Cardiovascular Res. Inst., San Francisco).

*Psychophysiology*, vol. 4, Jul. 1967, p. 83-89. 9 refs.

Grants PHS HE-06285, PHS FR-00122, and PHS 5T1-MH-7082.

Twenty percent changes in breathing rate (increases and decreases), sustained for ten min., did not change the average heart rate; however, increases in breathing rate tended to decrease the standard deviation of heart rate and decreases in breathing rate tended to increase the standard deviation of heart rate. Neither increases nor decreases in breathing rate abolished sinus arrhythmia. Finger pulse volume was decreased by both increases and decreases in breathing rate. The standard deviation of finger pulse volume was decreased during slow-paced breathing and unchanged during fast-paced breathing. The decrease in finger pulse volume occurred within the first min. during slow-paced breathing; however, during fast-paced breathing the decrease did not occur until about four min. after the onset of paced breathing.

**A67-82194****THE EVOKED HEART RATE RESPONSE: THE INFLUENCE OF AUDITORY STIMULUS REPETITION, PATTERN REVERSAL, AND AUTONOMIC AROUSAL LEVEL.**

William J. Meyers and Gary R. Gullickson (Iowa U., Inst. of Child Behavior and Develop., Iowa City and Inst. for Juvenile Res., Div. of Psychophysiol., Chicago, Ill.).

*Psychophysiology*, vol. 4, Jul. 1967, p. 56-66. 15 refs.

A brief two-component auditory stimulus was repeatedly presented at ten-sec. intervals to 48 college students. Analysis of the pattern of sec.-by-sec. changes in heart rate (HR) revealed

that the only reliable response to the first stimulus was HR deceleration. During the remainder of the first 20 trials, an acceleration was the predominant response in the HR curves. When the stimulus pattern was reversed on trial 21 to study "dishabituation," only a HR deceleration was again observed. A significant habituation effect appeared across trials employing an index based upon the difference between peak and trough values. Further analysis revealed that the two response components reflected in the peak and trough values of this index showed different rates of response decrement. The acceleratory component showed a rapid initial decrement and remained stable on subsequent trials, whereas the deceleratory component diminished more gradually. Level of autonomic arousal, as measured by skin conductance level, was unrelated to HR habituation.

**A67-82195****DISCRIMINATION OF TWO SLEEP STAGES BY HUMAN SUBJECTS.**

Judith S. Antrobus and John S. Antrobus (N.Y. City U., City Coll. and N.Y.U., New York City).

*Psychophysiology*, vol. 4, Jul. 1967, p. 48-55. 13 refs.

Grants NIMH MH 10956 and NIMH MH 06733.

Three adult females were awakened from electroencephalographic stage one rapid eye movement (REM) and stage two sleep and instructed to guess the stage of sleep from which they had been aroused. One subject obtained 27 correct discriminations (guesses) out of 29 awakenings after 84 training trials (awakenings). A second subject gave no indication of learning the discrimination in 65 trials; a third discriminated the two sleep stages significantly better than chance in 138 trials. It was suggested that the first subject successfully formed a stage 1 REM/2 concept that matched the occurrence of the sleep stages better than did the concept dreaming. Several problems in concept formation of internal states during sleep were discussed.

**A67-82196****PATTERNS OF BASAL SKIN RESISTANCE DURING SLEEP.**

Charles T. Tart (Calif. U., Davis).

*Psychophysiology*, vol. 4, Jul. 1967, p. 35-39. 12 refs.

There are qualitative differences between subjects in the pattern of basal skin resistance (BSR) through a night's sleep. The most common is a rapid rise to a maximum BSR value in the first hr., with a steady fall the rest of the night. A steady rise through the night is also common. No relationship between BSR and the occurrence of stage one electroencephalographic sleep with rapid eye movements was found.

**A67-82197****PACED RESPIRATION AND HEART RATE CONTROL.**

Jasper Brener and David Hotherhall (Tenn. U., Knoxville).

*Psychophysiology*, vol. 4, Jul. 1967, p. 1-6. 5 refs.

Found. Fund for Res. in Psychiat. supported research.

Five human subjects were presented with a high frequency tone on each short inter-heartbeat interval (IBI) and a low frequency tone on each long IBI. They were instructed to produce high tones in the presence of one visual stimulus and low tones in the presence of another under conditions of paced and unpaced respiration. The results indicated that control of heart rate is not dependent upon respiratory mediation.

**A67-82199****ACUTE ORAL TOXICITY OF DISTILLED WATER IN ALBINO RATS.**

Eldon M. Boyd and Irene Godi (Queen's U., Dept. of Pharmacol., Kingston, Ontario, Canada).  
*Industrial Medicine and Surgery*, vol. 36, Sep. 1967, p. 609-613. 13 refs.

MRC, Canada supported research.

The  $LD_{50} \pm S.E.$  of distilled water given intragastrically to young male albino rats on an empty stomach was  $469 \pm 51$  ml./kg.; the estimated maximal  $LD_0$  was 352 and minimal  $LD_{100}$ , 586 ml./kg. The clinical signs of acute intoxication were weakness, ataxia, frequency of urination, polyuria, dacryorrhea, abdominal bloating, diarrhea, pallor, prostration, cyanosis, tremors, a Straub reaction, exophthalmos, tachypnea, generalized convulsions, respiratory failure, and death in two to four hr. Some 4% of the deaths were delayed for several days. At autopsy, the weight and water content were increased in most organs and tissues, and the red blood cells were swollen, distorted, and adherent to sinus walls or thrombosed in veins. At 24 hr., survivors looked normal but had eaten less food, drunk less water, lost body weight, and showed a marked glycosuria, proteinuria, and alkaluria. After two wk., organ weights and water levels had returned to or toward normal limits, but residual toxicity was seen at one mo. in the form of weight loss and increase in water content of several organs.

#### A67-82200

##### EFFECTS OF MONETARY REWARDS AND PUNISHMENTS ON VIGILANCE PERFORMANCE.

Russell L. Smith, Luigi F. Lucaccini, and Murray H. Epstein (Calif. U., Los Angeles).

*Journal of Applied Psychology*, vol. 51, Oct. 1967, p. 411-416. 19 refs.

Calif. U. Supported research.

In a complex visual vigilance task lasting 1 hr., subjects in five experimental groups were rewarded for correct detections and punished either for missed targets or for false alarms. Subjects in a control group performed the task without possibility of reward or punishment. Three levels of monetary incentive were used as rewards. The major results of the study indicated that (a) some combinations of reward and punishment facilitated detection performance while others did not, and (b) subjects punished for missed targets performed better than subjects punished for false alarms. Implications for vigilance research and theory are discussed.

#### A67-82201

##### COLLEGE-BASED MENTAL HEALTH UNITS AND THE SELECTION OF ROTC CANDIDATES FOR FUTURE FLIGHT TRAINING.

David A. Hills (Wake Forest Coll., Center for Psychol. Serv., Winston-Salem, N.C.).

*International Psychiatry Clinics*, vol. 4, Winter 1967, p. 75-79.

It appears that there would be difficulties in effectively involving campus-based mental health units in the process of selecting-out inadequate flight school candidates. However, by providing the college mental health people with appropriate information, the counseling service could assist students in self-selection. By providing ROTC departments with easy access to aviators who can serve as living examples for the students to emulate, the ROTC program can become a more attractive and tangible avenue to a flight career than it may now be on some college campuses.

#### A67-82202

##### THE SERUM CHOLESTERIN LEVEL OF HIGHLY EFFICIENT ATHLETES UNDER EXHAUSTIVE BRIEF AND PROLONGED PHYSICAL EXERCISE [DER SERUMCHOLESTERINSPIEGEL BEI HOCHLEISTUNGSSPORTLERN UNTER ERSCHOPFEN- DER KURZ- UND AUSDAUERBELASTUNG].

G. Ahlert, S. Platzek, M. Rattay, and H. Wuschech.

*Das Deutsche Gesundheitswesen*, vol. 22, Jul. 6, 1967, p. 1266-1267. 8 refs. In German.

The serum cholesterol level prior to and after exhaustive physical exposure was determined in 56 highly efficient athletes. The rest position value of the total serum cholesterol proved to be lower in the athletes examined than in a comparative group who engaged in normal physical activity. Following the exposure, the cholesterol level rises so as to adapt to the rest position value after 30 min.

#### A67-82203

##### BIOTELEMETRY IN MEDICAL MONITORING.

William C. Sipple, R. J. Oleynik, and Russell D. Squires (U.S. Naval Air Develop. Center, Aerospace Med. Res. Dept., Physiol. Div., Johnsville, Pa.).

(*Am. Acad. of Phys. Med. and Rehabil.*, 28th Ann. Assembly, San Francisco, Aug. 29, 1966).

*Archives of Physical Medicine and Rehabilitation*, vol. 48, Sep. 1967, p. 451-455.

The authors describe a telemetry system for continuous monitoring of respiration, electrocardiogram, electroencephalogram and skin temperature that employs a standardized double frequency modulation system in combination with special sensors and signal conditioners. This system provides a radio-link between subject and recording station, thus eliminating wiring and allowing the subject complete freedom of movement.

#### A67-82204

##### SIMULATION OF BIOLOGIC SYSTEMS BY DIGITAL COMPUTER.

Gerald A. Kiern (Northwestern U., Med. School, Chicago, Ill.) and Floyd N. Heller (Ill. U., Urbana).

(*Am. Acad. of Phys. Med. and Rehabil.*, 28th Ann. Assembly, San Francisco, Aug. 29, 1966).

*Archives of Physical Medicine and Rehabilitation*, vol. 48, Sep. 1967, p. 456-462. 6 refs.

Grants NIH HE-07873 and B-MEC FR-00018-04.

A simulation model organization, which is a departure from the formalized mathematical model, can be described as a time-segmented, transaction-oriented simulation technique. This paper describes such a technique, using examples from the simulation of the uptake and distribution of anesthetic agents. The model consists of a numerical description (attributes) of the elements which comprise the system being simulated. These attributes are modified by events which are caused to occur at various points in simulated time.

#### A67-82205

##### SOME ASPECTS OF STEREOSCOPIC DEPTH PERCEPTION.

Kenneth N. Ogle (Mayo Clin. and Mayo Found., Sect. of Biophysics, Rochester, Minn.).

*Journal of the Optical Society of America*, vol. 57, Sep. 1967, p. 1073-1081. 28 refs.

Grant NINDB NB-1852.

Some of the fundamental facts of stereoscopic depth perception are described briefly. Emphasis is placed on experiments that provide evidence for a physiologic basis for the phenomenon: existence of limiting disparities, relationship to double images, role of simultaneous stimuli, the limiting delay between stimuli to the two eyes, role of vertical disparities, effect of unequal luminances, the role of training and of strabismus surgery, etc. A general though brief discussion of the theories of stereoscopic depth perception deals with psychologic cues, fixation eye movements,

fusional eye movements, Hering theory of local signs, gestalt point of view, and suppression theories. A few current problems are then considered; duration of stimuli, role of eye movements, effect of binocular rivalry, relationship of perceived depth to angular disparity, adaptation to conflicting empiric cues and stereoscopic depth, and the induced effect.

## A67-82206

## SPATIOTEMPORAL MODULATION TRANSFER IN THE HUMAN EYE.

F. L. van Nes, J. J. Koenderink, H. Nas, and M. A. Bouman (Utrecht U., Dept. of Med. and Physiol. Physics, Physics Lab., The Netherlands).

*Journal of the Optical Society of America*, vol. 57, Sep. 1967, p. 1082-1088. 19 refs.

The contrast sensitivity of the human eye for sinusoidal illuminance changes in space and time, obtained by means of traveling-wave stimuli, was measured as a function of spatial and temporal frequency for white light. The average retinal illuminance was varied between 0.85 and 850 trolands. The threshold modulation for perception of a moving grating is generally higher than that for detection of brightness changes, in space and/or time, that give rise to flicker phenomena. Flicker-fusion characteristics, as determined from the threshold for the flicker phenomenon, are found to lose their band-pass-filter resemblance for spatial frequencies of more than five cycles per degree of visual angle. The thresholds at flicker fusion for spatial- and temporal-frequency combinations in which not both frequencies are very low, appear to be proportional to the inverse of the square root of mean retinal illuminance in the investigated range. This suggests a photon-noise-dependent threshold mechanism which is operative in a wider illuminance range than that found with contrast-sensitivity measurements for periodic illuminance variations only in space or only in time.

## A67-82207

## DEVELOPMENT OF THE RESISTANCE OF RATS AGAINST 5 G AND 7.5 G ACCELERATION [VYVOJ ODOLNOSTI KRYS PROTI ZRYCHLENÍ 5 G A 7,5 G].

L. Jilek, Z. Susa, and S. Trojan.

*Sborník Lékařský*, vol. 69, Jan. 1967, p. 17-20. 13 refs. In Czech.

The resistance of rats against positive radial acceleration of 5 g and 7.5 g develops parallel with resistance against positive radial acceleration of 10 g. The time of survival is longer, the lower the g used. This applies in all age groups. The younger the organism, the more marked is this influence. Resistance against positive radial acceleration depends on the extent of circulatory disorders in the central nervous system (CNS). The less intense is the disturbance of the circulation in the CNS, the greater are individual differences in the response of nervous tissue to stagnation hypoxia. In five day old rats at 5 g, the disorder of the cerebral circulation is so small that the resistance of these individuals is hardly affected.

## A67-82208

## INFLUENCE OF ELECTROMAGNETIC WAVES UPON NERVOUS SYSTEM [VPLYV ELEKTROMAGNETICKÝCH VLN NA NERVOVÝ SYSTÉM].

Ladislav Božík and Jaroslava Gruberová.

*Pracovní Lékařství*, vol. 19, Aug. 1967, p. 249-251. 12 refs. In Czech.

Neurological and electroencephalographic (EEG) investigations were carried out on 120 workers chronically exposed to microwaves. The intensity of the field was within permissible limits or a little

higher. Neurologically there was frequently cephalgia (in 21.2%) which was of a vasomotoric nature. EEG recordings were positive in 25.9%. It was found that there were mostly slow waves with high amplitudes frequently with episodic character in the anterior parts of the head. Pathological EEG recordings were significantly more frequent in persons with cephalgia. Results were carefully evaluated because of other factors in the work environment which may give the same results in neurological findings.

## A67-82209

## FLIGHT SPEECH AUDIOMETRY IN THE MODEL INVESTIGATION OF ATTENTION-DISTRIBUTION IN AIR-PLANE CONTROL [LETECKÁ SLOVNI AUDIOMETRIE V MODELOVÉM VYŽKUMU DISTRIBUCE POZORNOSTI PRI RIZENÍ LETADLA].

V. Malcik and F. Zatocil.

*Ceskoslovenská Otolaryngologie*, vol. 16, Jun. 1967, p. 182-186. In Czech.

The ability of pilots to distribute their attention between two tasks, airplane control and the keeping of radio connection, was investigated by means of flight speech audiometry and simulated flight. It is assumed that some pilots are able to solve simultaneously more tasks in more difficult situations. However, upon examination of aerial catastrophes resulting from the unconsciousness of the pilot in an emergency situation to which his attention had been called, it was found that the pilots did not respond to instructions given by the control position. By examination it was proved that certain pilots are able to control both tasks simultaneously; however, there are also pilots who are not able to distribute their attention correctly. Therefore errors in airplane control are induced and a shift in the audiometric curve occurs. From these results, the above opinion regarding the cause for some aerial catastrophes is considered proven. It was concluded that the presented method is of importance for evaluation and compensation practice. Some physiological functions of the examined pilots were reported.

## A67-82210

## QUANTITATIVE ESTIMATION OF RADIATION CATARACT. II. PROTECTIVE EFFECT OF GLUTATHIONE UPON THE LENS INJURIES.

Jun-ichi Horiuchi and Katsuichi Kaneko (Tokyo Med. and Dental U., School of Med., Dept. of Radiol., Japan).

*Nippon Acta Radiologica*, vol. 27, Jun. 25, 1967, p. 265-271. 9 refs. In Japanese.

The protective action of glutathione against radiation cataract in young rats was studied. The growth rate of the lens and the incidence of mature cataract (complete opacities) were taken as the criteria for quantitative estimation of lens injury. Results were as follows: (1) Regression of lens weight was marked after four wk. in the group irradiated with a single dose of 1,500 r, and the lens weight resulted in about one third of the non-irradiated lenses. In this period, the incidence of complete opacity of the lens was also rapidly increased. (2) No definite protective effect was observed in the group administered glutathione just after irradiation. The regression of lens weight and the incidence of lens opacities were the same as in the irradiated group. (3) Marked protective effect of glutathione was noticed in the irradiated group receiving glutathione which was administered intraperitoneally 30 min. prior to irradiation. The injuries of the lens in the group which received glutathione were delayed about four to five wk. as compared to the group which did not receive the drug. (4) As for the epilation around the eyelid or "phymosis bulbi" due to corneal perforation, pre-administration of the drug showed a marked protective effect.

## A67-82211

**MACRO-AUTORADIOGRAPHIC STUDIES ON RADIOPROTECTIVE ACTION OF 5-HYDROXYTRYPTAMINE. I. NORMAL DISTRIBUTION PATTERN AND ITS CHANGES FOLLOWING X-IRRADIATION.**

Masatoshi Kashima and Osamu Matsuoka (Natl. Inst. of Radiol. Sci., Div. of Radiation Hazards, Chiba, Japan).

*Nippon Acta Radiologica*, vol. 27, Jun. 25, 1967, p. 315-330. 33 refs. In Japanese.

Whole-body macro-autoradiographic studies were carried out to investigate the mechanism of the action of serotonin (5-HT) which is a well-known protective agent against ionizing radiation and also a physiologically important biogenic amine. The present work was carried out to clarify the distribution of 5-HT in various conditions used in radioprotection. Fifty-eight adult male mice of the F<sub>1</sub> hybrid of CF 1 and RF strains were used. 0.1 ml. of about 5  $\mu$ Ci activity of <sup>14</sup>C-labeled serotonin (5-HT 3-<sup>14</sup>C-creatinine sulphate) and <sup>14</sup>C-Tryptophan (TP) or <sup>14</sup>C-5-Hydroxytryptophan (5-HTP) as its precursor in physiologic saline solution, was injected intravenously or intraperitoneally. The mice were killed and immersed in a mixture of acetone and solid carbon dioxide. Sectioning and autoradiographic techniques were carried out by the Ullberg method. One group of mice was used for the examination of normal distribution of those drugs while the other groups were exposed to a single dose of 1,000 r of total body X-irradiation before and after administration of <sup>14</sup>C-5-HT or <sup>14</sup>C-5-HTP. Results were: (1) in intravenous injection at tracer level of <sup>14</sup>C-5-HT, autoradiograms showed high uptake mainly in adrenals, spleen, kidneys, lungs, liver and blood, moderate uptake in bone marrow and intestinal mucosa, and low uptake in bone and central nervous system; (2) in the experiment with X-irradiation testing its effects on the distribution of 5-HT, results showed nearly an identical pattern as the above in the group to which <sup>14</sup>C-5-HT or <sup>14</sup>C-5-HTP was administered before irradiation. However, when these drugs were administered after irradiation, relatively higher uptake was observed in bone marrow; (3) at the protective action level of stable 5-HT with <sup>14</sup>C-5-HT added as tracer, high concentrations of 5-HT were located in the abdominal cavity during the period in which irradiation was carried out in an ordinary radioprotection experiment; (4) when <sup>14</sup>C-labeled precursor was administered instead of <sup>14</sup>C-5-HT for comparison, <sup>14</sup>C-TP, and <sup>14</sup>C-5-HTP were observed in relatively higher concentrations than <sup>14</sup>C-5-HT at the intestinal mucosa. Less uptake of <sup>14</sup>C-TP and high uptake of <sup>14</sup>C-5-HTP were observed in adrenals.

## A67-82212

**STARTLING NOISE AND RESTING REFRACTIVE STATE.**

Niles Roth (Calif. U., School of Med., Dept. of Surg./Ophthalmol., Los Angeles).

*British Journal of Physiological Optics*, vol. 23, no. 4, 1966, p. 223-231. 5 refs.

Grant PHS NB 2709.

Exposure of 11 human subjects to an unexpected 110 db noise resulted in hyperopic refractive changes averaging 0.15D (S.D. =  $\pm 0.05$ ). Hyperopic changes followed 58% of the 64 noise presentations. Myopic changes followed 5% and changes less than 0.10D comprised 30% of the responses. Any responses to the remaining presentations (approximately 8%) could not be measured because of excessive involuntary blinking by the subject. Pure tones, on the other hand, were much less effective than noises in eliciting refractive changes. Hyperopic changes occurred in 13% of the total number of pure tone presentations (138), and myopic changes in 5%. The present findings lead to the conclusion that for luminance levels equal to or greater than those employed in the present study (1 foot lambert), refractive changes following exposure to a 110 db noise would not be expected to interfere with the vision of most people, since the largest change (0.44D)

is less than the average depth of focus at the above luminance level. It is emphasized, however, that the foregoing conclusion applies only to the possible effects of refractive changes on vision since, in some cases, responses such as blinking or head and body movement may interfere with vision to a marked degree.

## A67-82213

**A STUDY OF THE EFFECT OF PERFECT RETINAL STABILIZATION ON SOME WELL-KNOWN VISUAL ILLUSIONS, USING THE AFTER-IMAGE AS A METHOD OF COMPENSATING FOR EYE MOVEMENTS.**

C. R. Evans (Natl. Phys. Lab., Autonomics Div., London, Great Britain) and R. P. Marsden (U. Coll., London, Great Britain).

*British Journal of Physiological Optics*, vol. 23, no. 4, 1966, p. 242-248. 12 refs.

Twelve common optical illusions were viewed by human subjects for the purpose of studying the operation of the visual system in the absence of eye movements. The after-image method was used for perfect stabilization. For the majority of the normal illusions, the absence of eye movements (when the image was perfectly stabilized) had no effect on the illusion. Of all the patterns viewed, only the concentric rings appeared markedly different in the two conditions of inspection. The absence of the radial or propeller effects in stabilized vision seemed to make it quite certain that the phenomenal lines are a function, not of cortical scanning, but of eye movements and consequent shifts of the image across the retina.

## A67-82214

**ORGANIC COMPOUNDS IN METEORITES—I. ALIPHATIC HYDROCARBONS.**

D. W. Nooner and J. Oro (Houston U., Dept. of Chem., Tex.). *Geochimica et Cosmochimica Acta*, vol. 31, Sep. 1967, p. 1359-1394. 69 refs.

The benzene-methanol extracts of 30 meteorites (carbonaceous chondrites, noncarbonaceous chondrites and graphite-troilite or troilite nodules from iron meteorites) were fractionated by silica gel chromatography and the aliphatic (n-heptane eluate) hydrocarbon fractions were analyzed by gas chromatography and gas chromatography-mass spectrometry. A study of the chromatograms from n-heptane eluates permits the following conclusions: (1) aliphatic hydrocarbons (predominantly paraffinic) were found in varying amounts in all the meteorites studied. The hydrocarbons ranged from 0.1 to 25.8 p.p.m. for Type I, 8.3 to 150 p.p.m. for Type II, 8.2 to 415 p.p.m. for Type III, 0.1 to 3.2 p.p.m. for the non-carbonaceous chondrites, and 2.8 to 15.5 p.p.m. for the graphitic nodules; (2) peaks corresponding to norpristane, pristane and phytane (in addition to normal and isomeric alkanes) were observed in practically all of the meteorites. Mass spectrometric evidence for the latter two isoprenoids was obtained in at least five different carbonaceous chondrites and one graphitic-troilitic nodule. Relatively low levels of pristane and phytane were found in the Type I carbonaceous chondrites and the non-carbonaceous chondrites; (3) no general predominance of odd over even carbon-number alkanes in the range analyzed was observed except for one sample in the n-C<sub>22</sub>-n-C<sub>27</sub> range. An examination of the lower molecular weight alkanes in a few meteorite samples showed a predominance of normal pentadecane over normal hexadecane. The hydrocarbons in three meteorites had bimodal distributions indicating two syntheses of sources for the hydrocarbons; (4) analysis of inside samples and samples from different sources showed the distribution of aliphatic hydrocarbons in one sample to be heterogeneous qualitatively and quantitatively; (5) identical patterns were not observed within, or between, Wik Types I and II. However, most of the meteorites of Type II were

similar qualitatively in the n-C<sub>15</sub>-n-C<sub>21</sub> range. In addition, a few Type III meteorites were similar qualitatively, in this range, to the meteorites of Type II; (6) the majority of the hydrocarbon patterns of the meteorites analyzed were similar, in the low molecular weight range, to chromatographic patterns of ancient sediments, crude oil, terrestrial graphite and other terrestrial samples; (7) the iron meteorites were similar to those of Type II and some of Type I carbonaceous chondrites. The external part of the nodules was found to contain five times more hydrocarbons than the inside suggesting either an external source of the hydrocarbons or that the hydrocarbons originally inside were partially destroyed or consumed.

#### A67-82215

##### ORGANIC CONSTITUENTS OF METEORITES—A REVIEW.

J. M. Hayes (Chicago U., Enrico Fermi Inst. for Nucl. Studies, Ill. and Mass. Inst. of Technol., Dept. of Chem., Cambridge). *Geochimica et Cosmochimica Acta*, vol. 31, Sep. 1967, p. 1395-1440. 29 refs.

NASA Grants NsG 211-62 and NASA NsG-366.

All meteoritic organic chemical analyses published since 1900 were critically reviewed. Inactive during the first half of the century, this field was revived by the modern realities of spaceflight and exploration, but work has been concentrated on searching the organic constituents of the carbonaceous chondrites for compounds possibly indicative of extraterrestrial life. The characteristics and thermal histories of the various classes of chondrites were very briefly reviewed. It was shown that certain classes other than carbonaceous chondrites might reasonably be expected to contain organic material. The distribution of carbon among these classes was discussed, and the forms which carbon takes in each case were noted. It was shown that significant amounts of extractable organic material may be expected not only in the carbonaceous chondrites but also in the unequilibrated ordinary chondrites and the ureilites. Evidence indicating that volatile materials, possibly including carbon and its compounds, are heterogeneously distributed in chondrite specimens was considered. Amounts of organic material extracted or volatilized from various meteorite specimens were tabulated. Various crude but informative studies undertaken using unfractionated extracts were discussed. Data indicating the elemental composition and general chemical nature of meteorite extracts were tabulated and the infrared and ultraviolet absorption spectra of meteorite extracts and crude fractions were described and discussed. Isotope ratio analyses of extracts, volatilized and combusted materials, and whole stones were discussed and the carbon and hydrogen isotope ratios found in carbonaceous chondrite analyses were tabulated. Analytical studies proving or claiming to prove the presence in meteorites of particular organic compounds were discussed critically and in detail. Evidence indicating that certain analytical studies of hydrocarbons and of amino acids were crucially affected by the presence of contaminating materials was considered. It was concluded that optically active compounds have not been proven to be present in meteorites. Possible origins of meteorite organic compounds and the relations of these origins to theories of meteorite origin were briefly discussed.

#### A67-82216

##### TERATOGENIC ACTION OF HYPOXIA UNDER NORMAL ATMOSPHERIC PRESSURE.

Yuzo Noguchi, Yoshio Nakayama, and Yoshio Kowa (Tanabe Seiyaku Co., Ltd., Clin. Pharmacol. Dept., Products Control Lab., Osaka, Japan).

*Japanese Journal of Veterinary Science*, vol. 29, Feb. 1967, p. 11-19. 22 refs.

Eight groups of pregnant mice were exposed to 5% oxygen under normal pressure for six hr. on days, 7, 8, 9, 10, 11, 12,

13 and 14 of gestation. The offspring produced were examined for gross and skeletal malformations. The death rate increased in groups treated later in pregnancy. Exencephalia occurred in 11.1% of the offspring produced in the group treated on day 9. Cleft palate occurred with significant frequency in groups exposed on days 11 and 12. Cardiac hernia was observed only in the group exposed on day 9. Limb malformations were most frequent in the group exposed on day 10. They included amelia and digital abnormalities, such as adactyly, oligodactyly, and polydactyly. The occurrence of these malformations was restricted to the left limbs. Tail abnormalities were observed in four groups, those exposed on days 9, 10, 11 and 12. This result indicates a wide range of susceptibility for tail malformation. Subcutaneous hematomas of the nose and the toe were observed in groups exposed on days 12, 13 and 14. The thoracic and lumbar vertebrae were more liable to malformation than any other vertebrae. The highest incidence of vertebral malformation was displayed in the first to third cervical vertebrae in the group exposed on day 8, in the first to fourth thoracic vertebrae and ribs in the group exposed on day 9, in the lumbar vertebrae in the group exposed on day 10, and in the caudal vertebrae in the groups exposed on days 11 and 12. The later the treatment, the more caudal was the site of the malformation. Hypoxia under normal atmospheric pressure produced almost the same teratological results in mice as hypoxia under low pressure.

#### A67-82217

##### RETICULAR AND THALAMIC MULTIPLE UNIT ACTIVITY DURING WAKEFULNESS, SLEEP AND ANESTHESIA.

Stanley J. Goodman and Philip E. G. Mann (NIH, Clin. Center Anesthesiol. Dept. and NIMH, Lab. of Neurobiol., Bethesda, Md.). *Experimental Neurology*, vol. 19, Sep. 1967, p. 11-24. 21 refs.

Recordings of multiple unit activity from reticular and thalamic sites of cats were analyzed during wakefulness, sleep, and anesthesia. All anesthetics studied caused a decrease in averaged multiple unit activity and a variable pattern of multiple unit bursts. There were considerable differences in averaged activity associated with assessed anesthetic depth among the various anesthetics. The decline in averaged activity with ether and cyclopropane during light anesthesia was not greater than the decline that occurred during slow-wave sleep. With cyclopropane, even deep anesthesia was associated with averaged activity not lower than that occurring with slow-wave sleep. Furthermore, the multiple unit bursts that appeared during anesthesia were similar to the bursts occurring during slow-wave or paradoxical sleep. Thus different anesthetics have quantitatively different effects on the spontaneous discharge of reticular and thalamic units. In addition, there is neither a uniquely diminished level of spontaneous spike activity nor a unique pattern of spike activity that characterizes the anesthetic state. The characteristics of spontaneous unit firing at reticular and thalamic sites cannot be used to differentiate between wakefulness, sleep and anesthesia.

#### A67-82218

##### THE ACQUISITION OF CONDITIONAL DISCRIMINATIONS IN BABOONS FOLLOWING TEMPORAL AND FRONTAL LESIONS.

Susan D. Iversen and L. Weiskrantz (Cambridge U., Psychol. Lab., Great Britain).

*Experimental Neurology*, vol. 19, Sep. 1967, p. 78-91. 17 refs. Grants USAF 63-64 and PHS 5 R01 NB04800-02.

Baboons with bilateral inferotemporal lesions or with more extensive temporal lobe lesions learned a size-color conditional problem as easily as the normal controls, and more easily than those with dorsolateral frontal lesions. Despite the use of training techniques designed to equalize the initial learning scores of all

the animals, the temporal operates were significantly impaired on the acquisition of the size discrimination. However, the finding that they were able to use this newly acquired visual information in the more complex conditional learning situation does not indicate a general inability to form stimulus-response associations with visual information. On the contrary, the results suggest that the principal difficulty of animals with temporal lesions is related to the initial perceptual analysis of the discrimination. If they are given sufficient experience with certain visual material, this acquired information is available for use in more complex visual learning situations. This experiment therefore provides another demonstration of the fact that despite a severe impairment on classical pattern discriminations, animals with inferotemporal lesions are able to learn certain visual problems.

#### A67-82219

##### ALCOHOL EFFECTS ON HUMAN BEHAVIOUR UNDER REWARD AND PUNISHMENT.

M. Vogel-Sprott (Waterloo U., Dept. of Psychol., Ontario, Canada). *Psychopharmacologia*, vol. 11, Sep. 1967, p. 337-344. 7 refs. Grant NRC, Canada APA-93.

The effect of low doses of alcohol (.80 to .50 mg./cc.) on human behavior under reward (money) and punishment (shock) was examined in two studies. The experiments examined drug effects on a response under the following sequences of treatments: (1) reward; (2) conflict (i.e. reward and punishment); and (3) extinction. In both studies, no drug effect on behavior was observed under treatments which immediately preceded or followed conflict. Under conflict, placebo subjects tended to suppress their response while no such suppression was displayed by alcohol subjects. General "problem-solving" during treatments also was examined and failed to alter significantly under alcohol. The evidence was considered to support animal research indicating that low doses of alcohol reduce the suppressing effect of punishment in a conflict situation.

#### A67-82220

##### SACCADIC AND SMOOTH PURSUIT EYE MOVEMENTS IN THE MONKEY.

A. F. Fuchs (Johns Hopkins U., School of Med., Dept. of Med., Baltimore, Md.).

*Journal of Physiology*, vol. 191, Aug. 1967, p. 609-631. 15 refs.

Grants PHS HSP-17,237 and AM-05524.

Voluntary eye movements were measured in the chronic, unanesthetized monkey. A training technique is described which conditions the animals to follow a large variety of target trajectories. The eye movements of the monkey are not qualitatively different from those of man. In response to random target motions the monkey also employs a combination of saccadic and smooth pursuit movements. Monkeys execute their saccades more rapidly than humans. Monkeys are capable of attaining smooth pursuit velocities which are twice as fast as those of man. Most of the critical experiments showing the separate nature of the saccadic and smooth pursuit modes in man have been performed on monkeys with similar results. Therefore, if one remains aware of the quantitative differences between the two primates, results of neurophysiological studies of the oculomotor system of the monkey can be expected to have considerable relevance when extrapolated to man.

#### A67-82221

##### A THEORETICAL PREDICTION OF THE NORMAL CARDIAC OXYGEN CONSUMPTION.

Theodore A. Wilson (Minn. U., Dept. of Aeron. and Eng. Mech., Minneapolis).

*Biophysical Journal*, vol. 7, Sep. 1967, p. 585-594. 8 refs.

Grant NIH HE-09724.

A model is described from which the entropy production associated with the process of transporting oxygen and carbon dioxide between the lungs and the muscles of the body can be calculated. The two entropy sources which are assumed to be the dominant ones for this process are the entropy production associated with the metabolism of the heart and the entropy production associated with the diffusion of oxygen and carbon dioxide into and out of the blood. The hypothesis that the observed blood flow is the one for which a given amount of oxygen and carbon dioxide is transported between the lungs and the muscles with minimum total entropy production is used to predict the value of the slope of the cardiac oxygen consumption vs. blood flow curve. At a blood flow of 15 l./min., the predicted value of the slope of this curve is 1.2 ml./l.

#### A67-82222

##### FINE STRUCTURE OF MYOCARDIAL MITOCHONDRIA IN RATS AFTER EXERCISE FOR ONE-HALF TO TWO HOURS.

Rubén P. Laguens and César L. A. Gómez-Dumm (Comisión de Invest. Cient. de la Prov. de Buenos Aires, Dept. of Electron Microscopy, La Plata, Argentina).

*Circulation Research*, vol. 21, Sep. 1967, p. 271-279. 17 refs.

Acute exercise (swimming in water at 24°C.) provoked marked changes in the fine structure of the mitochondria of heart muscle in rats. At 60 min. after the start of exercise, a large number of invaginations appeared in the mitochondrial wall, suggesting the existence of replication phenomena. In the interior of the invaginations, electron-dense granules considered to be ribosomes were seen. After 90 and 120 min. of swimming, mitochondria of unusual size, measuring several sarcomeres in length, were seen. The enlarged mitochondria showed no structural alterations. The planimetric measurement of the micrographs of myocardium of the control animals and of those that exercise showed a statistically significant increase in the whole mitochondrial mass in the latter. On the basis of these observations it was suggested that acute exercise can produce an increase in the mitochondrial mass of the heart muscle cell in a short time.

#### A67-82223

##### TEMPORAL CHARACTERISTICS OF VASOMOTION. I. ON THE PROCESS OF RESISTANCE VARIATIONS ON SKIN VASCULATURE DURING INDIRECT STIMULATION [ZEITLICHE EIGENSCHAFTEN DER VASOMOTORIK. I. UBER DEN VERLAUF VON WIDERSTANDSÄNDERUNGEN AN HAUTGEFÄSSEN BEI INDIREKTER REIZUNG].

J. Polster, H. Sella, P. Langhorst, and H. P. Koepchen (Munich U., Physiol. Inst., West Germany).

*Pflügers Archiv für die gesamte Physiologie*, vol. 296, Aug. 2, 1967, p. 95-109. 28 refs. In German.

The resistance to flow was measured with high sensitivity in an isolated skin area of dogs. Constrictions of the vessels were induced by stimulation of the skin nerve. The shortest latency measured between a single stimulus and the beginning of the constriction was 230 msec. By a single stimulus or by a short burst of stimuli, constrictions were induced with a characteristic time course: the increase of resistance varied between 5 and 30% of the control, but the time of increase to maximum value and the time of decrease to the control value were nearly constant in all cases. The increase time was 8 to 10 sec. and the decrease time 30 to 40 sec. Consequently the steepness of the increase and decrease was a function of the constriction amplitude. Three kinds of constriction patterns were observed during continuous

constant stimulation: (a) continuous increase of the resistance until a new steady state was reached. This increase could continue over long periods at low stimulation frequencies, e.g. more than one hr. at one stimulus/sec.; (b) first increase and thereafter decrease of resistance during stimulation; (c) appearance of periodic constrictions and dilatations. When the time interval between two single stimuli was varied systematically, the greatest constrictions occurred at stimulus intervals between 20 and 50 msec. At longer or shorter stimulus intervals the resulting constriction decreased down to the effect of one single stimulus. The relation between stimulus frequency and constriction amplitude was studied with constant numbers of stimuli. This relation showed a steep increase at low frequencies up to a maximum between 20 and 50/sec. and a continuous decrease at higher stimulation frequencies. The curve agreed well with the known results from other vascular areas and with the effects of the double stimuli described above. It was suggested that the form of the observed vascular reaction was caused partly by properties of the vascular smooth muscle and partly by the kind of transmitter release from the nerve endings.

## A67-82224

**TEMPORAL CHARACTERISTICS OF VASOMOTION. II. APPEARANCES AND GENERATION OF SPONTANEOUSLY AND NERVOUSLY INDUCED VASCULAR RHYTHM [ZEITLICHE EIGENSCHAFTEN DER VASOMOTORIK. II. ERSCHEINUNGSFORMEN UND ENTSTEHUNG SPONTANER UND NERVOUS INDUZierter GEFÄSSRHYTHMEN].**

H. Sella, P. Langhorst, J. Polster, and H. P. Koepchen (Munich U., Physiol. Inst., West Germany).

*Pflügers Archiv für die gesamte Physiologie*, vol. 296, Aug. 2, 1967, p. 110-132. 43 refs. In German.

Deut. Forschungsgemeinschaft supported research.

The oscillations of the resistance to flow in an area of isolated perfused skin were studied in dogs. The oscillations started at perfusion pressures of 70 to 80 mm. Hg. The frequency distribution of their period durations had a peak at about 25 sec. and a smaller one at the double period duration. Continuous stimulation of the skin nerve evoked rhythmic constrictions or increased amplitude and frequency of the spontaneous constrictions. Rhythmic stimulation synchronized the oscillations of the vessels with the stimulation rhythm within a limited range of frequencies above and below the spontaneous frequency. Outside of this range the vascular rhythm followed with integer multiples of the stimulation frequency. Independent oscillations in two different vascular regions could be synchronized by rhythmic stimulation of the common nerve. Rhythmic stimulation with intervals greater than 4 to 6 sec. induced oscillations, whose amplitude increased with increasing stimulation interval to a maximum at 25 to 30 sec. interval and decreased again at longer intervals ("resonance"). The excitability measured by the constricting effect of equal nervous stimulation depended on the phase of the spontaneous constriction cycle. It was maximal at the beginning and during the raising phase of the constriction, minimal at the peak of the constriction. If the spontaneous oscillations were abolished by lowering the perfusion pressure, the same time course of excitability was found. Some preparations developed no spontaneous oscillations at any perfusion pressure. They followed the rhythmic stimulation always in a 1:1 relation and showed no resonance. Their excitability was constant during the constriction cycle. The various kinds of spontaneous and reactive rhythmicity of resistance vessels can be deduced from the described time course of excitability. The formal similarities of the described rhythmicity to other biological rhythms and their role in the total circulatory system were discussed.

## A67-82225

**STEREOTYPED ACTIVITIES PRODUCED BY AMPHETAMINE IN SEVERAL ANIMAL SPECIES AND MAN.**

A. Randrup and I. Munkvad (Sct. Hans Hosp., Dept. E. Roskilde, Denmark).

*Psychopharmacologia*, vol. 11, Sep. 1967, p. 300-310. 55 refs.

Knud Højgaard's Fond and Copenhagen Hosp. Admin. supported research.

Experiments with chickens, pigeons, mice, rats, guinea-pigs, cats, dogs, squirrel-monkeys and chimpanzees showed that stereotyped activity can be produced by amphetamine in doses of 1 to 20 mg. kg. in all these species. In man amphetamine in higher than therapeutic doses, can produce a psychosis, which so closely resembles schizophrenia, that misdiagnoses have been made. All the known symptoms of schizophrenia are reported, including stereotyped activity.

## A67-82226

**EFFECT OF ACUTE BARBITURATE POISONING ON SERUM LEVELS OF INDICATOR ENZYMES IN RATS [WPŁYW OSTREGO ZATRUCIA ZWIĄZKAMI BARBITUROWYMI NA POZIOM ENZYMOW WSKAZNIKOWYCH W SUROWICY KRWI SZCZURÓW].**

Wacław Banaszkiewicz, Marta Stasińska, and Czesław Majewski. *Acta Physiologica Polonica*, vol. 18, Jan.-Feb. 1967, p. 107-116.

15 refs. In Polish.

Activities of glutamic oxalacetic and glutamic pyruvic transaminases were studied in white rats in the course of acute barbiturate poisoning. Toxic doses of barbiturates cause an increase in oxalacetic and pyruvic transaminase activities in the serum of the rats. The increase in the enzyme activities depended on the dosage and type of barbiturate administered. Values of oxalacetic transaminase activity were higher and appeared earlier than elevation of pyruvic transaminase activity. Toxic doses of barbiturates injure the liver parenchyma cells.

## A67-82227

**THE OSCILLATION OF THE HUMAN CORNEORETINAL POTENTIAL AT DIFFERENT LIGHT INTENSITIES.**

Louis D. Homer and Hansjörg E. J. W. Kolder (Emory U., Atlanta, Ga.).

*Pflügers Archiv für die gesamte Physiologie*, vol. 296, Aug. 2, 1967, p. 133-142. 7 refs.

The response of the corneoretinal potential was forced by repeated light and dark phases of 12.5 min. duration each. This frequency is known to bring the corneoretinal potential oscillation into resonance. The intensity of the light stimulus was varied from 0.04 cd-m<sup>-2</sup> to 6884 cd-m<sup>-2</sup>. A mathematical model, built on the assumption of information transmission and feedback among four components, was modified to accommodate the response to repeated stimulation. The model predicts that only three parameters should depend on light intensity. The results confirmed this prediction. The model predicts also that these three parameters should be linearly related to light intensity and that the estimated values of the remaining parameters should agree with values obtained from a previous study using a different pattern of stimulation. These predictions could not be substantiated. The findings indicated that the response of the systems is non-linear. The nonlinearity was described in sufficient detail to assist in the development of more advanced models.

## A67-82228

**EFFECTS OF HIGH ALTITUDE ON PERFORMANCE OF THREE DIFFERENT TYPES OF WORK.**

Wayne O. Evans and C. Frank Consolazio (Fitzsimons Gen. Hosp., U.S. Army Med. Res. and Nutr. Lab., Denver, Colo.).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 41-50. 10 refs.

To determine the effects of transition from a low altitude to a high altitude on three types of work performance, the rate at which the subject proceeded from low to high altitude, and the effects of a physical conditioning program, twenty-four young soldiers were studied at sea level. Their maximum performance on medicine ball putting (an explosive strength task), the bicycle ergometer (a stamina task), and chin-ups (a dynamic strength task) were measured. Half of the subjects participated in a physical conditioning program; subjects daily exercise was based upon exercise at 90% of his own maximum capacity. Eight subjects remained at sea level, eight subjects ascended to an altitude of 14,110 ft. gradually (1 wk. each at an altitude of 5,200 ft. and 11,400 ft.), eight subjects went directly to 14,110 ft. within one day. It was not possible to predict the amount of depression of performance capacity found at high altitude. Dynamic strength was not affected by high altitude, but explosive strength and stamina were. Explosive strength readapted within two wk; stamina had not readapted after one mo. Gradual transition to high altitude was beneficial for the explosive strength but did not effect stamina. Physical conditioning proved efficacious in reducing performance decrement in explosive strength and stamina.

#### A67-82229

##### AMINO-ACID AND PEPTIDE SYNTHESIS FROM HYDROGEN CYANIDE.

A. B. Sidle (Great Britain, Roy. Coll. of Surgeons, London). *Nature*, vol. 216, Oct. 28, 1967, p. 408.

Two criticisms are made of the hydrogen cyanide synthesis of amino acid systems. In these systems azeotropic hydrochloric acid is used, and unless it is fresh amino acids may appear after refluxing. The second criticism is that amino acids and their precursors can be detected in rainwater and snow indicating that they are presently being made abiogenically.

#### A67-82230

##### EFFECT OF INFORMATION CONTENT AND SIZE UPON THE ABSOLUTE THRESHOLD FOR MOVEMENT.

N. F. Dixon (London U. Coll., Great Britain).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 37-40. 4 refs.

From the finding that the absolute threshold for rotational movement was significantly lower for a field of randomly, as opposed to regularly, distributed black and white squares it was hypothesized that only in the case of high selective information-content fields would there be an inverse relationship between size of elements and the movement threshold. Movement thresholds, obtained for random and regular displays containing different sizes of internal element, confirmed the crucial role of selective information in determining the movement threshold but did not support the predicted size effect. This apparent paradox may be explained by the reduced confidence which subjects experience when judging the movement of random displays.

#### A67-82231

##### NOTE ON "RELATION OF STIMULUS-SEEKING BEHAVIOR AND AROUSAL LEVEL".

Richard L. Cahoon (U.S. Army Res. Inst. of Environ. Med., Natick, Mass.).

*Psychological Reports*, vol. 21, Aug. 1967, p. 211-212. 10 refs.

A recent study purporting to test directly the optimal-arousal hypothesis is reviewed. Several methodological errors are pointed out, and questions are raised concerning the author's interpretation of the negative results obtained.

#### A67-82232

##### RECALL OF TWO MESSAGES PRESENTED IN SEQUENTIAL ALTERNATE WORDS.

Anne W. Story (NASA, Electron. Res. Center, Washington, D. C.) (*APA, Ann. Meeting, New York City, Sep. 1966*).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 53-64. 7 refs.

The words of two familiar quotations, each six words in length, were presented alternately at a rate of one word per sec. Eighteen pairs of quotations or messages were presented. It was hypothesized that the more words the subject reported from one message in correct contiguous order, omitting alternately interposed words as displayed, then the more words he would report from the other message in correct contiguous order. Although the hypothesis was verified, a learning effect occurred, with correct sequencing of the message whose first word appeared first on the display, increasing over trials at a faster rate than did correct sequencing of the message whose first word appeared second on the display.

#### A67-82233

##### EFFECTS OF ILLUMINATION AND WHITE NOISE ON THE RATE OF ELECTRICAL SELF-STIMULATION OF THE BRAIN IN RATS.

Edmond R. Venator (Miss. U., Med. Center, Lab. of Exptl. Behavior, University), Barbara S. Uehling, and Walter Isaac (Emory U., Atlanta, Ga.).

*Psychological Reports*, vol. 21, Aug. 1967, p. 181-184. 14 refs.

Grants PHS MH-04539, PHS 5F2-MH-21,681, and PHS 5F1-MH-17,636.

A consistency in the effects of food deprivation and amphetamine administration on both gross locomotor activity and electrical self-stimulation of the brain (ESSB) is noted. The effects of sensory conditions on ESSB were investigated. Rats were trained to press a bar for rewarding brain stimulation. When subjects had stabilized, they were tested in a complete factorial design composed of four levels of illumination and two levels of noise. It was found that subjects pressed more under the medium illumination condition than under any other level of illumination, while white noise had no significant effects. Since rats are more active in the dark than in the light, it is concluded that illumination has unlike effects on activity and rate of ESSB.

#### A67-82234

##### PERCEPTION OF HORIZONTALITY AS A FUNCTION OF AGE AND STIMULUS SETTING.

James D. Barna and Daniel C. O'Connell (Saint Louis U., Mo.).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 70-72.

Estimation of horizontality was tested by having three groups of 43 subjects in the first and third grades and first year college draw the water surface on pictures of tilted glasses, simulating a half-filled condition. The two primary grade groups did not appear to grasp the concept of horizontality, while college subjects made relatively accurate estimations. These results empirically supported the conclusion of Piaget and Inhelder, reconfirmed Smedslund's results, and failed to confirm Rebelsky's conclusion that adults make as much error as young children.

#### A67-82235

##### ANXIETY, MEPROBAMATE, D-AMPHETAMINE AND THE INTRA-SUBJECT VARIABILITY OF WORD ASSOCIATES.

Nathan Brody, Ernest A. Peterson (Miami U., Med. School, Fla.), Morgan Upton, and Richard Stabile (Rutgers U., New Brunswick, N.J.).

*Psychological Reports*, vol. 21, Aug. 1967, p. 113-120. 14 refs.

Grant NIMH MH 08383-01.

Two experiments on the intra-subject variability of word associates are reported. Experiment One indicates that subjects high in anxiety have more variable word associates than subjects low in anxiety. Experiment Two investigated the joint effects of anxiety and the drugs, meprobamate and d-Amphetamine. Meprobamate reduced variability, d-Amphetamine increased variability. There was a significant drug x anxiety interaction. High-anxiety subjects were more variable than low-anxiety subjects under meprobamate and placebo conditions but less variable under d-Amphetamine conditions. The results are discussed in conjunction with the Hullian proposal of additivity of different sources of drive. It is concluded that the other sources of drive detract from the drive-arousing properties of anxiety.

**A67-82236****MAGNESIUM PEMOLINE: ACTIVATION OF EXTINCTION RESPONDING AFTER CONTINUOUS REINFORCEMENT.**

George S. Grosser, Richard C. Sprinthall, and Lee Sirois (Am. Intern. Coll., Springfield, Mass.).

*Psychological Reports*, vol. 21, Aug. 1967, p. 11-14.

Magnesium pemoline prolongs performance in extinction following continuous reinforcement although not affecting prior acquisition of food-reinforced lever pressing. Eight subjects were given magnesium pemoline and eight a placebo. One wk. later subjects were extinguished, eight on magnesium pemoline and eight on placebo. It was found that, although magnesium pemoline had no effect on acquisition, it did significantly prolong extinction.

**A67-82237****AUTOKINESIS OF AN INTERMITTENT LUMINANCE.**

D. G. Pearce and Sharon M. Abel (Defence Res. Med. Labs., Toronto, Canada).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 278-280. 5 refs.

Twenty subjects were used in an experiment to determine whether autokinetic latency and displacement of an intermittent luminance reach minimum and maximum, respectively, at the same rate of intermittence. It was found that autokinetic latency and displacement of a small, low-luminance stimulus reach minimum and maximum, respectively, in the region of 2 to 16 c.p.s. Measures repeated over five days disclosed no systematic effects of repeated exposures to the illusion.

**A67-82238****STIMULATION SEEKING THROUGHOUT SEVEN DAYS OF SENSORY DEPRIVATION.**

Seward Smith, Thomas I. Myers, and Eugene Johnson, III. (Naval Med. Res. Inst., Bethesda, Md.).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 261-271. 15 refs.

Sixty volunteer Naval enlisted men participated in a study of seven-day, individual isolation. Forty subjects lived in small, dark, quiet rooms with little to do (SD). The other 20 served in a live-in-the-lab control group (C) with *ad lib.* access to lights, recreational materials, and intercom conversation with another C subject if mutually desired. Nineteen SD subjects, but only 1 C subject, requested early release. Pre-, during-, and post-isolation tests were given. In a test of stimulation seeking, boring stock reports could be heard during a 1-hr. period on each of Days 1, 4, and 7 of isolation. SD subjects selected to listen significantly more than Cs on Days 4 and 7, with the differences increasing over time. Day 1 listening (about six hr. after isolation began) predicted who would later request release. In the discussion, currently available stimulation-seeking data are summarized and integrated.

**A67-82239****CUE TIMING IN A MULTI-DIMENSIONAL DETECTION TASK.**

S. M. Forbes, M. M. Taylor, and P. H. Lindsay (Defence Res. Med. Labs., Toronto, Canada).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 113-120. 6 refs.

The effects of pre- and post-stimulus cues on detection were studied using two-alternative forced-choice tasks. The stimuli used were tones presented to subjects through earphones and dots presented on TV monitors. The tones varied in pitch and intensity and the dots varied in displacement both horizontally and vertically. Thus subjects could be required to make discrimination in four dimensions. Performance on one-dimensional input—one-dimensional output was superior to that for four-dimensional input—one-dimensional output even when the stimulus for which a response was required was cued 4.0 sec. before its presentation. The duration of the post-stimulus cue delay, 0.10 sec. to 4.0 sec., had no differential effect on performance levels. These results are quite different from those reported for absolute judgment tasks.

**A67-82240****MOTOR SKILLS BIBLIOGRAPHY: LXXII. PSYCHOLOGICAL INDEX NO. 15, 1908.**

R. B. Ammons and C. H. Ammons (Mont. U., Missoula).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 111-112. 34 refs.

This listing contains 34 references to research on motor skills.

**A67-82241****PERCEPTION OF DEPTH IN ROTATING OBJECTS: 1. STEREOKINESIS AND THE VERTICAL-HORIZONTAL ILLUSION.**

Roy B. Mefferd, Jr. and Betty A. Wieland (Veterans Admin. Hosp., Psychiat. and Psychosomat. Res. Lab., Houston, Tex.).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 93-100. 19 refs.

Observers viewed under extreme reduction conditions either a rod or an ellipse as it rotated slowly (5 r.p.m.) in the frontoparallel plane. They reported seeing a sequence of percepts of the luminous stimulus starting with veridical rotation, then expansion-contraction, and/or advance-retreat and finally ending with apparent rotation in a plane oblique to the observer. The percepts were the same with either monocular or binocular regard and with the head tilted 90° to the side. In the latter case, the apparent plane of rotation shifted with the head position showing that the visual field determined the effect. This stereokinetic effect was related to the vertical-horizontal illusion and was explained in terms of the asymmetry of the visual field.

**A67-82242****PROACTIVE INHIBITION, RECENCY, AND LIMITED-CHANNEL CAPACITY UNDER ACOUSTIC STRESS.**

Donald Eldredge and Allen C. Busch (AF Systems Command, Electron. Systems Div., Decision Sci. Lab., Bedford, Mass.).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 85-91. 9 refs.

This study investigated the effects of an increase in the level of acoustic stress (signal-to-noise ratio) on the retrieval of message sets of 2, 3, or 4 unrelated words presented successively. The results indicated that noise degradation did indeed affect the efficiency with which subjects retrieve sequences of successively presented items. It was noticed that the retention of the initial

item of a message set caused a marked decrement in the retention and retrieval of subsequent items of the message set and that the effect increased as a function of the number of words presented. The effects were attributed to proactive inhibition, recency, and limited-channel capacity.

#### A67-82243

##### PERCEPTION BIBLIOGRAPHY: XLVII. PSYCHOLOGICAL ABSTRACTS, 1934, VOLUME 8, PART 2.

C. H. Ammons and R. B. Ammons (Mont. U., Missoula).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 281-284. 115 refs.

A bibliography of sensory perception listed 115 references alphabetically. These works were published in 1934.

#### A67-82244

##### TWO POSSIBLE MECHANISMS OF DIFFERENTIAL SET IN TACHISTOSCOPIC PERCEPTION OF MULTIPLE TARGETS.

E. Rae Harcum (William and Mary Coll., Williamsburg, Va.).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 289-304. 45 refs.

Grant PHS HD 00207-07

Two conceptions of set are discussed as possible explanations for hemifield differences in perceptual accuracy for tachistoscopic patterns. One conception implies a general facilitation for all stimuli in one hemifield, usually the right. The other implies a selection of certain stimuli, usually on the left, to be scanned first, favored by a primacy effect. Both notions of set are necessary to account for existing data.

#### A67-82245

##### PICTURE MEMORY IN THE CHIMPANZEE.

Donald N. Farrer (6571st Aeromed. Res. Lab., Holloman AFB, N. Mex.).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 305-315.

Complex cognitive functioning of chimpanzees on tasks with five relational cues was reexamined, and a new hypothesis (picture-memory) was presented involving the memorization of a list of stimuli each of which was rewarded if, and only if, it was presented within a particular stimulus configuration. The first experiment demonstrated the picture-memory hypothesis by showing successful performance on a four-choice discrimination task which was essentially a match-to-sample task without the presence of the sample. In the second experiment, the picture-memory hypothesis was examined in more detail by omitting part of the total stimulus configuration and measuring the resultant performance decrement. It was concluded that loss of stimuli proximal to the rewarded stimulus interfered with the picture-memory behavior more than the loss of distal stimuli, but the behavior was most seriously disrupted by the loss of the rewarded stimuli. In the third experiment, the total stimulus configuration was tested by presenting the mirror image of the original pictures. The inability of the chimpanzees to generalize immediately to the reversal of the original stimulus configurations was demonstrated, and it was concluded that the mirror-image stimuli were, in essence, new pictures to be memorized.

#### A67-82246

##### THE EFFECTS OF VOLUNTARILY CONTROLLED ALVEOLAR HYPERVENTILATION ON CARBON DIOXIDE EXCRETION.

J. C. Stoddart (R.A.F. Inst. of Aviation Med., Farnborough, Hants, Great Britain).

*Quarterly Journal of Experimental Physiology and Cognate Medical Sciences*, vol. 52, Oct. 1967, p. 369-381. 15 refs.

Four subjects hyperventilated at three carefully controlled alveolar ventilation levels. It was found that carbon dioxide excretion and the rate of change of alveolar carbon dioxide tension were related to the alveolar ventilation. Three exponential components were recognized in the carbon dioxide excretion curves and their time constants determined. These were related to the body stores from which carbon dioxide was removed. The slope of the whole body carbon dioxide dissociation curve was found to be related to the alveolar ventilation level and ranged from 1.17 to 2.03 ml./mm./Hg/min.

#### A67-82247

##### DAILY RHYTHMS OF RENAL EXCRETION IN ARCTIC-DWELLING INDIANS AND ESKIMOS.

Mary C. Lobban (Natl. Inst. for Med. Res. (Hampstead Labs.), Div. of Human Physiol., London, Great Britain).

*Quarterly Journal of Experimental Physiology and Cognate Medical Sciences*, vol. 52, Oct. 1967, p. 401-410. 23 refs.

Roy. Soc. and Wellcome Trust supported research.

The daily rhythms of renal excretion of indigenous arctic subjects were recorded under natural conditions during the continuous midsummer daylight (Indians and Eskimos) and in the continuous darkness of midwinter (Indians only). The excretory patterns for water, potassium, sodium and chloride were compared with those of a group of British control subjects, recorded when they were newly introduced into a summer arctic environment in adult life. In general, the excretory patterns of the arctic subjects contained a high proportion of abnormalities, such that the averaged patterns for the indigenous groups were less well defined than were those for the control group of subjects from a temperate zone. The loss of definition of the rhythms was most marked in the Eskimo subjects, where differences between day and night excretory rates had virtually disappeared. Mathematical analysis of the individual results showed that the relative amplitude of the rhythm of potassium excretion decreased from British controls → summer Indians → winter Indians → summer Eskimos. The differences between control subjects and all indigenous subjects and between Indians and Eskimos were significant, and could not be accounted for by variations in age, activity pattern or diet. It was suggested that the normal daily alternation of light and darkness in the environment is important not only for the day-to-day maintenance of renal diurnal rhythms but also for the initiation and full expression of these rhythms in the early life of the human subject.

#### A67-82248

##### RELATION OF PERCEPTUAL STYLE TO MEASURES OF VISUAL FUNCTIONING.

Gerald V. Barrett, Patrick A. Cabe, and Carl L. Thornton (Goodyear Aerospace Corp., Akron, Ohio).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 235-236.

Measures of Witkin's concept of perceptual style were obtained with a Rod and Frame apparatus from 44 subjects and correlated with individual measures of macular stereopsis and phoria obtained from a Keystone Orthoscope. As none of the Spearman rhos were significant, individual differences in perceptual style appear not to be a function of the measured individual visual characteristics.

#### A67-82249

##### PERCEIVED SIZE AND DISTANCE OF FAMILIAR OBJECTS.

Walter C. Gogel (Calif. U., Santa Barbara) and Henry W. Mertens (Civil Aeromed. Inst., Oklahoma City, Okla.).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 213-225. 8 refs.

The relation between the perceived size and distance of a playing card and its retinal size was studied using both stationary

**A67-82250**

and moving stimuli. A distinction between absolute and relative familiar size cues was supported by the experimental results in that successive judgments of the distance of different retinal sizes of the cards were not predictable solely from cues of absolute retinal size. The data from both the stationary and moving stimuli suggest, however, that the perceived distance of the initial presentations resulting from the absolute size cue provides a metric for the distance perceptions resulting from cues of relative size. As indicated by the results from the initial presentations, the absolute size cue to distance from familiar objects in this study was a highly variable determiner of perceived distance.

**A67-82250****EFFECT OF COLD ON CORTICAL POTENTIALS IN THE CAT.**

Arthur F. Battista (N.Y.U. Med. School, Dept. of Neurol. Surg., New York City).

*Experimental Neurology*, vol. 19, Oct. 1967, p. 140-155. 49 refs.

Grant NINDB 5 P)1-NB PO1-NB 04257.

The spontaneous cortical activity and various evoked cortical potentials were recorded in 35 adult cats anesthetized with intraperitoneal pentobarbital, and surface cooled until these electrical potentials disappeared. The various types of electrical potentials were affected "differentially" as the brain temperature decreased. The barbiturate burst-activity was the most susceptible to cold, and disappeared in the brain temperature range of 32.5° to 25°C. The brain became isoelectric at 23° to 19°C. In these studies, the cortical somesthetic potential evoked by sciatic or median nerve stimulation was most resistant to cold, and disappeared in the brain temperature range of 17° to 15°C. No convulsive activity was noted in the recorded spontaneous electrical cortical activity as the animal was cooled under pentobarbital anesthesia; the importance of direct brain temperature recordings was emphasized.

**A67-82251****PHENOMENAL SHAPE AS A FUNCTION OF AMBIGUITY OF CONTOUR PERSPECTIVE.**

A. H. Smith (Defence Res. Med. Labs., Toronto, Canada).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 121-127. 8 refs.

Subjects made outline drawings of the apparent shapes of a rectangle and three trapezoids, exposed under reduced viewing conditions at slant of 10°, 25°, and 40°. The four forms were of equal height and area. The smallest projective angular convergence of the sides of the frontal-parallel trapezoids was larger than that of the rectangle at its maximum slant. Subjects distinguished significantly between forms and angles of slant. The shape indices for the monocular and binocular groups did not differ significantly, and the interaction between eye(s) and form was not significant. The data were interpreted, with those of a similar experiment on slant by another investigator as supporting a formulation of the shape-slant relation in which phenomenal shape is primary, phenomenal slant subsidiary.

**A67-82252****PERFORMANCE ON A VIGILANCE TASK UNDER CONDITIONS OF TRUE AND FALSE KNOWLEDGE OF RESULTS.**

D. C. Antonelli (IBM Systems Develop. Div., Human Factors Eng., Rochester, Minn.) and G. G. Karas (Iowa State U., Iowa City). *Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 129-138. 14 refs.

A vigilance study comparing the effects of true and false knowledge of results is presented. The study determines at what point, if any, the effects of false knowledge of results (FKR) reflect the results of earlier vigilance studies involving true knowledge of results (KR). The task used required a response to a signal on a display panel. The KR was either true or randomly generated FKR. Latency of response was the dependent variable. The results demonstrated that groups receiving KR do not differ significantly in performance from groups receiving FKR. The best results were obtained at the 100% feedback level, a drop occurred at the 50% level, and the hypothesized drop in performance occurred between 30% and 20%.

**A67-82253****MOTOR SKILLS BIBLIOGRAPHY: LXXIII. PSYCHOLOGICAL INDEX NO. 16, 1909.**

C. H. Ammons and R. B. Ammons (Mont. U., Missoula).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 139-140. 56 refs.

An alphabetical listing is presented of 56 references to research on motor skills.

**A67-82254****EFFECTS OF INDUCED MUSCLE TENSION ON JUDGMENT OF TIME.**

Joel S. Warm, Richard P. Smith (Louisville U., Ky.), and Lee S. Caldwell (U.S. Army Med. Res. Lab., Fort Knox, Ky.)

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 153-160. 22 refs.

Contract DA-49-193-MD 2918.

The functional relation between induced muscle tension and temporal perception was explored. Judgments of the duration of four intervals (6, 12, 24, and 48 sec.) were made under five levels of muscle tension (0, 10, 20, 30, and 40% of maximum grip strength) by the methods of reproduction and verbal estimation. The effects of degree of muscle tension were negligible at the two shortest stimulus durations. At the two longer intervals, perceived duration decreased as a non-monotonic function of muscle load. Findings were independent of the psychophysical methods employed. Disparities in the magnitude of duration judgments secured by the two psychophysical methods were also dependent upon stimulus duration. At 24 and 48 sec., verbal estimates of the standard interval were significantly longer than reproductions. Differences in response magnitude between methods were not observed at the two shortest stimulus intervals. Results are discussed in terms of the general relation between activity level and temporal perception and in terms of the problem of methodological equivalence in judgments of time.

**A67-82255****APPARENT VIBRATION OF VERTICAL LINES.**

William R. Feeney and Myron L. Braunstein (Calif. U., Irvine).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 173-176. 11 refs.

Grant NSF GB 3923.

Displays of motionless vertical lines sometimes produce an impression of vibration. The relative strength of this impression was explored for 40 subjects, using a paired-comparison procedure, for displays of black lines subtending visual angles from 2° to 20° of arc and having black to white area ratios of 1:1.5 and 1:3. The maximum impression of vibration was found for lines between 3' and 10' with 1:1.5 spacing.

**A67-82256****EFFECTS OF COMPLEXITY AND REDUNDANCY ON THE TACTUAL RECOGNITION OF METRIC FIGURES.**

Emerson Foulke and Joel S. Warm (Louisville U., Ky.)

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 177-187. 19 refs.

Contract HEW 3104.

An attempt was made to assess the influence of two information parameters, viz., complexity and redundancy, on the tactual recognition of metric figures by 24 sighted and 24 blind subjects. Four levels of complexity were used with random and Redundancy-1 forms. The stimuli were raised dots and standard braille values were employed for dot height and spacing. Efficiency of performance was measured in terms of both speed and accuracy of recognition. Although the results were in part dependent upon response measures, the following overall trends were noted: (a) efficiency of performance was greater in the blind than in the sighted subjects and for random as compared to Redundancy-1 figures and (b) speed and accuracy of recognition tended to decrease with increments in stimulus complexity. The data were interpreted as supporting central factors in form perception and as illustrating the need for close attention to the nature of performance indices employed in the study of the perception of form.

**A67-82257****PERCEPTION BIBLIOGRAPHY: XLVI. PSYCHOLOGICAL ABSTRACTS, 1934, VOLUME 8, PART 1.**

R. B. Ammons and C. H. Ammons (Mont. U., Missoula).

*Perceptual and Motor Skills*, vol. 25, Aug. 1967, p. 205-208. 112 refs.

References (112) to research on various aspects of visual, auditory, and tactual perception are listed alphabetically.

**A67-82258****VISUAL THRESHOLD CHANGES RESULTING FROM SPONTANEOUS SACCADIC EYE MOVEMENTS.**

George W. Beeler, Jr. (Calif. Inst. of Technol., Pasadena).

*Vision Research*, vol. 7, Sep. 1967, p. 769-775. 10 refs.

Grant NIH NB 03627.

Visual thresholds were measured during the 200 msec. interval spanning small, spontaneous saccadic eye movements. Brightness thresholds measured foveally with a stabilized retinal image showed a maximum increase of 0.5 log units, starting 60 msec. before the flick and lasting 75 msec. afterwards. Another experiment measured the subject's ability to detect 15 min. arc target motions. Ninety-three per cent of these step movements were visible normally, but none were perceived when they coincided with the eye movements. This effect spans the saccade by 100 msec. and is not the result of the brightness threshold change.

**A67-82259****CHANGES IN THE DIRECTION OF INDUCED ANISEIKONIC SLANT AS A FUNCTION OF DISTANCE.**

Barbara Gillam (Reading U., Dept. of Psychol., Great Britain).

*Vision Research*, vol. 7, Sep. 1967, p. 777-783. 6 refs.

The nature of the binocular slant and shape distortions induced by 90° magnification of one retinal image was investigated as a function of stimulus distance. At close distances both distortions were in accordance with geometric prediction. At distances above 126 cm. the slant distortion was reported to be in the reverse direction from prediction in a significantly high proportion of cases, whereas the shape distortion disappeared. It was proposed that "reverse slants" result from the interpretation of the shape distortion as a perspective and that perspective cues to slant are more relied on at greater distances.

**A67-82260****EFFECTS ON VESTIBULAR HABITUATION OF INTERRUPTING NYSTAGMIC RESPONSES WITH OPPOSING STIMULI.**

William E. Collins (FAA, Office of Aviation Med., Civil Aeromed. Inst., Oklahoma City, Okla.).

*Journal of Comparative and Physiological Psychology*, vol. 64, Oct. 1967, p. 308-312. 12 refs.

Failure of nystagmus habituation to occur under certain conditions of vestibular stimulation has been ascribed to a failure to allow the response to run its course. In this study, three groups of cats were tested under conditions of repeated rotation in which Group A received unidirectional stimulation, Group B received bidirectional stimulation with both responses allowed to run their course, and Group C received bidirectional stimulation with the response in one direction interrupted. Habituation occurred for all groups in spite of the different test procedures.

**A67-82261****A CLOSED CIRCULATORY SYSTEM MODEL.**

Matthew N. Levy and Harrison Zieske.

*Physiologist*, vol. 10, Nov. 1967, p. 419-424.

A closed-system model of the cardiovascular system was described which consists of a pump, an arterial capacitance, a peripheral resistance and a venous capacitance. The interrelationships between cardiac output and venous return can be easily studied and curves constructed using this model. One objection to the model is that the controlled variable is in the heart rate rather than the stroke volume.

**A67-82262****PROTEIN CATABOLISM IN STARVATION AFTER DIETS HIGH AND LOW IN PROTEIN.**

D. Utley and H. M. Whyte (Sydney Hosp., Kanematsu Mem. Inst., Australia).

*Australasian Annals of Medicine*, vol. 16, Aug. 1967, p. 200-204. 15 refs.

Natl. Health and Med. Res. Council, Australia supported research.

Two subjects ate diets high (HP) and low (LP) in protein for 14 days, then continued them for a further three control days, starved for three days (taking only water, salt and vitamins) and then took 300 g. of sucrose each day for three days. Urea and creatinine clearance rates were 17% to 38% lower on the LP than on the HP diet. Starvation was easily tolerated after the HP diet but was severely distressing after the LP diet. Starvation caused the daily urinary nitrogen loss to decrease after the HP diet from 14.8 to 11.9 g., and to increase after the LP diet from 6.8 to 12.2 g. The suggested explanation is that protein catabolism reverted in starvation to the rate which was appropriate for metabolizing the amount of protein habitually eaten before the experiment.

**A67-82263****ASSESSMENT OF NUTRITIONAL STATUS OF MEN: PROTEIN.**

Itsiro Nakagawa and Youko Masana (Inst. of Public Health, Dept. of Nutr. and Biochem., Tokyo, Japan).

*Journal of Nutrition*, vol. 93, Oct. 1967, p. 135-141. 8 refs.

Eight healthy young men were used as experimental subjects in a study to learn whether a deficiency of tryptophan, lysine, or methionine affects the constituents of urine and blood plasma. A simple method by which an early deficiency of protein or of any essential amino acids might be detected was evaluated. Nitrogen balance generally became negative after deprivation of any of the essential amino acids. After a short-term deficiency, as in the

present experiment, excretion of creatinine remained constant and the excretion of urea and 17-ketosteroids varied in a normal range. On day 8 of tryptophan deprivation the excretion of N-MNA decreased, and that of pyridone decreased in two subjects and increased in one subject. In the deprivation of lysine or methionine, there was no significant trend of change. The concentration of plasma amino nitrogen remained normal. The plasma aminogram did not show any specific pattern that could be related to a deficiency of protein or of an essential amino acid. However, the free amino acid ratio in plasma increased significantly during the deficiency period, and this might be of value in detecting subclinical levels of protein deficiency.

## A67-82264

**PHOTOSENSITIVE EPILEPSY: RELATIONSHIPS BETWEEN THE VISUAL EVOKED RESPONSES AND THE EPILEPTIFORM DISCHARGES INDUCED BY INTERMITTENT PHOTIC STIMULATION.**

Yasuo Hishikawa, Junji Yamamoto, Eiji Furuya, Yoshihide Yamada, Kiyoshi Miyazaki, and Ziro Kaneko (Osaka U., Med. School, Dept. of Neuropsychiat., Japan). (*Japan. Soc. of Psychiat. and Neurol., Ann. Meeting, Tokyo, May 7-9, 1966*).

*Electroencephalography and Clinical Neurophysiology*, vol. 23, Oct. 1967, p. 320-334. 63 refs.

In 15 patients with photosensitive epilepsy the characteristics of the electroencephalographic (EEG) epileptiform discharges induced by intermittent photic stimulation (IPS) were investigated. In all the patients generalized EEG epileptiform discharges were induced by IPS. Averaged visual evoked responses to single flashes of light in the patients were similar morphologically to those of normal subjects. The photosensitivity of the patients decreased remarkably during drowsiness. No epileptiform discharges were induced during slow wave sleep. In the rapid eye movement stage of sleep the discharges were on the contrary as promptly induced as in the waking state. This phenomenon did not seem to be due to pupillary miosis. Monocular stimulation markedly reduced the epileptogenic effect of IPS as compared to binocular stimulation. Background illumination appeared to modify the epileptogenic effects of IPS. Some considerations on the neural mechanisms involved in epileptic photosensitivity were presented.

## A67-82265

**THE EFFECT OF SLEEP ONSET ON THE AUDITORY AVERAGED EVOKED RESPONSE.**

Edward M. Ornitz, Edward R. Ritvo, Everett M. Carr, Steven La Franchi, and Richard D. Walter (Calif. U., Center of Health Sci., Neuropsychiat. Inst., Los Angeles.)

*Electroencephalography and Clinical Neurophysiology*, vol. 23, Oct. 1967, p. 335-341. 12 refs.

Grants PHS NB-02808 and CSDMH 65-2-43.

The auditory averaged evoked response (AER) was measured at the vertex in normal children and adults during the transition from wakefulness to sleep and throughout the night. The amplitude of wave N<sub>2</sub> at sleep onset was compared to values obtained during subsequent non-REM sleep. The largest amplitude of wave N<sub>2</sub> of the auditory AER occurred within ten min. of sleep onset regardless of state of consciousness. The influence of sleep onset *per se* on wave N<sub>2</sub> amplitude was greater than the effect of stage of sleep.

## A67-82266

**PERCEPTUAL ORGANIZATION IN STATIC DISPLAYS FOR MAN/MACHINE SYSTEMS.**

R. S. Easterby (Aston U., Birmingham, Great Britain).

*Ergonomics*, vol. 10, Mar. 1967, p. 195-205.

The examination of some of the perceptual organization aspects of display design has led to the conjunction of three distinct but related approaches—the semantic/syntactic model based on language models, the uncertainty/structure model based on multivariate information theory, and an attempt to relate some fundamental aspects of form recognition to display design based on gestalt theory. In terms of the operator's perceptual organization, the form of signification—geographical, operational or functional—must be carefully related to this task, particularly in regard to stimulus-response or concept task training. It is to the unified theories of perception that we must look for our developing principles of systems display design. This, in conjunction with the language and information theory models, should enable some rational and more powerful tools for systems display analysis and synthesis.

## A67-82267

**FAULT DIAGNOSIS TRAINING FOR MAINTENANCE PERSONNEL.**

K. W. Tilley (Roy. AF Tech. Training Command, Brampton, Great Britain).

*Ergonomics*, vol. 10, Mar. 1967, p. 206-213.

The author outlines his views on a system approach to training. A concrete example of an attempt to apply a systems approach to the problem of training men to maintain complex equipment is also presented and discussed. The maintenance system, systems approach to training (including job analysis, job specification, defining training requirements, developing appropriate training methods, evaluating training course, and ensuring the retention of the acquired knowledge and skill), and fault-diagnosis training are covered in the discussion. The analytic methods demanded by a systems approach to training are capable of identifying the training requirements that are necessary, sufficient and efficient for the performance of maintenance work.

## A67-82268

**THE EFFECT OF HYPERSTRIATAL LESIONS ON HEAD ORIENTATION TO A SOUND STIMULUS IN CHICKENS.**

Norma Jean Adamo and Thomas L. Bennett, Jr. (N. Mex. U., Depts. of Anat. and Psychol., Albuquerque).

*Experimental Neurology*, vol. 19, Oct. 1967, p. 166-175. 7 refs.

NASA Grant NsG (T) 62.

The present investigation was undertaken to determine the functional role of the hyperstriatal regions in the chicken's reflex head orientation to a sound stimulus, and, to examine hyperstriatal function in the habituation of this response. Half of the chickens were presented with 0.2 sec. of white noise; the other half with 2 sec. of the same stimulus. Head orientation responses were observed, rated, and recorded following presentation of the sound stimulus for ten consecutive trials during each of five test sessions. Following preoperative testing, bilateral hyperstriatal lesions were produced surgically and seven days later the preoperative testing procedure was repeated. Unoperated and sham operated controls were treated similarly. Significant intersession habituation of the head orienting response occurred only preoperatively for both groups. Significant intrasession habituation was absent preoperatively and postoperatively for the two groups. Hyperstriatal lesions significantly affected the final preoperative level of habituation of the response for the 0.2-sec. group. Postoperatively there was a significant increase in the average number of incorrect responses for all bilaterally operated subjects. These data indicate that the hyperstriata, especially the accessory hyperstriatum, in chicken play a functional role in habituation of the head orienting response to sound stimulation and in localization of sound in space.

**A67-82269****PHOTIC EVOKED POTENTIALS IN THE CAT: EVIDENCE FOR A DIRECT GENICULATE INPUT TO VISUAL II.**

Mark Berkley, Ellen Wolf, and Mitchell Glickstein (Wash. U., Reg. Primate Res. Center, Seattle).

*Experimental Neurology*, vol. 19, Oct. 1967, p. 188-198. 13 refs.

Grants PHS MH-06722-05, PHS 5T1 NB 5082-11, and PHS 5T1 6M 260-08.

High-amplitude, short-latency, gross evoked potentials may be recorded outside of striate cortex in the cat. Amplitude and latency of early evoked activity to full-field illumination were studied under chloralose or barbiturate anesthesia. Data from monopolar and bipolar recordings suggest that the high-amplitude area is coextensive with anatomic area 18 (visual II). The short-latency activity in this region survives ablation of contralateral areas 17 and 18, section of the corpus callosum, and lesion of medial and posterior ipsilateral area 17. Lesions in the lateral trilateral portion of the dorsal lateral geniculate nucleus (LGN) severely diminish this high-amplitude activity. In one cat, mapped 28 days following geniculate lesion, regions of reduced potentials correlated well with areas of dense preterminal degeneration (Nauta). Lesions in the medial portion of LGN have lesser effects. The dense, direct geniculate input to visual II, supported by both anatomical and physiological evidence, should be considered in formulation of models of visual function in the cat.

**A67-82270****BARORECEPTOR REFLEXES AND AUTOREGULATION OF CEREBRAL BLOOD FLOW IN THE DOG.**

Carlos E. Rapela, Harold D. Green, and Adam B. Denison, Jr. (Wake Forest U., Bowman Gray School of Med., Dept. of Physiol., Winston-Salem, N. C.).

*Circulation Research*, vol. 21, Oct. 1967, p. 559-568. 21 refs.

Grants PHS HE 00487, PHS HE-5392, PHS HE-344; Life Insurance Med. Res. Fund supported research.

Cerebral venous outflow was measured in anesthetized dogs at the confluence of the sagittal and straight sinuses, with the lateral sinuses occluded. Denervation of the carotid bifurcation increased systemic arterial pressure about 25.8 mm. Hg and decreased cerebral vascular conductance about 0.018 ml./min.mm. Hg; stimulation of the carotid sinus nerve decreased systemic arterial pressure and increased cerebral vascular conductance. Graded constrictions of the common carotid arteries induced transient responses of the cerebral blood flow that were characteristic of an autoregulatory process. Plots of the steady-state pressures and flows during the decreases of perfusion pressure were concave toward the pressure axis, were similar before and after denervation of the carotid bifurcation, and were indicative of autoregulation. We conclude that pressoreceptors in the carotid bifurcation or other pressoreceptors in systemic vessels upstream from the carotid bifurcation are not necessary for the control of the "tone" of the cerebral vasculature or in the mechanism of the autoregulation of cerebral blood flow.

**A67-82271****SIGNAL-DETECTION PERFORMANCE BY SUBJECTS DIFFERING IN PREDISPOSITION TO DAYDREAMING.**

John S. Antrobus, Ronald Coleman, and Jerome L. Singer (New York City U. City Coll., N. Y.).

*Journal of Consulting Psychology*, vol. 31, Oct. 1967, p. 487-491. 11 refs.

Grant NIMH M-10956.

Subjects representing extremes on questionnaires of prior disposition to daydreaming frequency and thoughtfulness also

differed in reports of task-irrelevant imagery during rapid-rate auditory signal-detection sessions. While high daydreamers showed a significant performance decrement over time in general, they did not show significantly more detection errors than did low daydreamers. Results suggest that data obtained from questionnaire responses are relevant to performance in an experimental situation and also support a model relating daydreaming trends to certain patterns of preference for internal or external stimulation even under relatively demanding and alerting conditions of rapid signal presentation.

**A67-82272****EVALUATION OF HUMAN OPERATOR COUPLED DYNAMIC SYSTEMS.**

K. C. Garner (Aeron. Coll., Cranfield, Bedford, Great Britain).

*Ergonomics*, vol. 10, Mar. 1967, p. 125-138.

This brief account of human-operator dynamics and some trends in parameter evaluation techniques is perhaps notable for the omission of explicit references to the work of many important researchers. For the diligent, those references given will make good this omission to some extent. It is perhaps worth re-emphasizing the effect of the environment on the human operator in order to discourage loose talk of the "human operator transfer function" without qualifying it with a description of the machine in which the operator is coupled. Finally, while a mathematical function is conceptually an exceedingly concise and nice way of describing a dynamic system or a human operator, it may be that we shall have to become used to describing these complex systems in terms of computer programs or analogue configurations in the future. If, by whatever means we use for describing the human operator coupled system, we succeed in designing efficient and safe systems in which the operator is "comfortable" the work will have been amply justified.

**A67-82273****MAN-MACHINE ALLOCATION IN MILITARY SYSTEMS.**

K. G. Corkindale (Roy. Aircraft Estab., Farnborough, Great Britain).

*Ergonomics*, vol. 10, Mar. 1967, p. 161-166.

There are certain areas of the man-machine allocation problem which should, in the foreseeable future, become clearer for, perhaps, three main reasons. First, the growing awareness of the concept of cost-effectiveness is leading to a broadening of system criteria and to greater emphasis on considering all possible criteria early in the development of a system. Second, the need for behavioral data to be in a form readily applicable to engineering problems is now generally accepted. One can hope that this realization of a need will lead to appropriate action. Third, the concept of man-machine complementarity rather than man-machine comparability has changed the basic philosophy of task allocation in a potentially useful manner. For these reasons it is hoped that the present decade will see much greater progress in the search for an effective task allocation procedure than was the case in the 1950's.

**A67-82274****ADAPTATION TO ALTITUDE OF ITALIAN ATHLETES FOR THE OLYMPIC GAMES AT MEXICO CITY [SULL'ADATTAMENTO ALL'ALTITUDINE DEGLI ATLETI ITALIANI PER LE OLIMPIADI DI CITTA' DELL'MESSICO].**

A. Scano (Centro di Studi e Ric. di Med. Aeron. e Spaziale, Rome, Italy).

*Rivista di Medicina Aeronautica e Spaziale*, vol. 30, Apr.-Jun. 1967, p. 324-338. 78 refs. In Italian.

A short survey is presented of the environmental conditions of Mexico City and of the most important physiological phenomena of adaptation. Descriptions are given of some experiments carried

out by investigators of different countries to study the behavior of athletes engaged in those sports which are affected adversely by altitude as far as maximum performance and recovery are concerned. Investigations carried out by Italian researchers, particularly those performed under the care of the Center of Aerospace Medicine, are included. Studies of acclimatization and medico-physiological preparations of the Italian athletes to the Olympic games of 1968 are also given. The writer stresses the contribution of the Medical Officers of the Italian Air Force to the scientific formulation and the practical realization of this program.

## A67-82275

**EVOLUTION OF VERTEBRAL FRACTURES FROM EJECTION. MEDICO-LEGAL CONSIDERATIONS [EVOLUZIONE DELLE FRATTURE VERTEBRALI DA EJEZIONE E CONSIDERAZIONI MEDICO-LEGALI].**

P. Italiano.

*Rivista di Medicina Aeronautica e Spaziale*, vol. 30, Apr.-Jun. 1967, p. 307-323. 25 refs. In Italian.

The writer that followed for many years (two to ten) ten ejected pilots who incurred vertebral fractures, reports and evidences evolution of the most common radiological findings: (1) fracture of the antero-superior margin of the vertebra; and (2) wedge-shaped fracture of the vertebra. The first one becomes stable with only minor morphological changes of the vertebral body and its corresponding intervertebral disk, simulating sometimes a normal radiological aspect. The second one generally becomes stable with a clear aspect of spondylo-disk-arthritis. In his medico-legal considerations the writer stresses that these lesions are not all necessarily disqualifying to jet flight. Each case must be evaluated cautiously, in respect mainly to its clinic and radiologic sequelae, as well as to pilot's personality and specific activity.

## A67-82276

**SOME ASPECTS OF SO-CALLED TRAUMATIC DISEASE [SU ALCUNI ASPETTI DELLA COSIDDETTA MALATTIA TRAUMATICA].**

G. Paolucci (Centro di Studi e Ric. di Med. Aeron. e Spaziale, Rome, Italy).

(*Congr. Nazl. di Med. del Traffico*, IV, Bologna, May 4-5-6, 1967). *Rivista di Medicina Aeronautica e Spaziale*, vol. 30, Apr.-Jun. 1967, p. 292-306. 8 refs. In Italian.

Impacts of  $+10g_x$  repeated in time, produced mild changes of activity of serum enzymes in dogs; only monamine dehydrogenase increased clearly, 30 min. after impact and normalized after 24 hr. One animal died; shortly before death an unexpected increase of all the enzymatic activities was found. In this animal the anatomo-pathological aspect of internal organs was characterized, in addition to obvious hemorrhagic lesions, by fibrosis of liver and spleen and hyperthrophy of adrenal gland cortex. These findings induced the formulation of the hypothesis of immunity reaction.

## A67-82277

**CONTRIBUTION TO THE STUDY OF MEDICO-LEGAL PROBLEMS OF FLIGHT ACCIDENT INJURIES [CONTRIBUTO ALLO STUDIO DEI PROBLEMI MEDICO-LEGALI RELATIVI ALLA LESIVITA' DA DISASTRI AEREI].**

G. Rotondo (Milan U., Ist. di Med. Legale e delle Assicurazioni, Italy).

*Rivista di Medicina Aeronautica e Spaziale*, vol. 30, Apr.-Jun. 1967, p. 251-291. 45 refs. In Italian.

Close collaboration is needed between specialists of forensic and aviation medicine in investigation of flight accidents. These

are surveyed in their different types and traumatic mechanisms. Different body lesions, reported in victims of flight accidents, are examined extensively. They are divided in lesions pertaining to the skeleton, internal organs, and external teguments. Pathogenetic interpretation of each lesion is discussed. Reconstruction of causes of flight accidents is discussed. This can be possibly carried out through differential characteristics of various traumatic findings of the different types of accidents, considering kinematics of the single accident, as well as the phase in which the lesion took place. From this reconstruction useful elements can be obtained for prevention of flight accidents and dependent injuries.

## A67-82278

**VISUAL ACUITY IN HYPOXIA, MEASURED WITH SYMBOLS SHOWN SEPARATELY OR UNITEDLY [COMPORTAMENTO DEL VISUS IN IPOSSIA, MISURATO CON SIMBOLI RAVVICINATI E PRESENTATI SINGOLARMENTE].**

R. Neuschüller (Rome U., Clin. Oculist., Italy) and M. Frustaci (Centro di Studi e Ric. di Med. Aeron. e Spaziale, Rome, Italy).

*Rivista di Medicina Aeronautica e Spaziale*, vol. 30, Apr.-Jun. 1967, p. 240-250. 21 refs. In Italian.

Retinal discrimination was studied at different degrees of hypoxia (with oxygen mixture at 13.6 and 9.2%) by having the subject read single and united E. This test, was used in the subjects studied. In 13 out of the 32 subjects tested, a decrease of different degree of retinal discrimination was reported in hypoxia. Significant differences between the eyes and precise correlation between the two simulated altitudes and the rate of discrimination decrease were not found. The retinal discriminative power increased in six subjects, that had shown previously a different response in reading single and united E, by increasing the normal luminosity of the optotypes from 90 to 140 lux. This result can be explained with the favorable effect on vision of the increased optotypes luminosity, due to hypoxia, on photopic luminous sensibility and retina distress.

## A67-82279

**MAXIMAL AEROBIC WORK AND ATHLETIC PERFORMANCE [IMPORTANZA DEL MASSIMO LAVORO AEROBICO PER IL RENDIMENTO DELL'ATLETA].**

S. Hatzikonstantinou, D. Papanastassiou, E. Economides, and N. Pournaras.

*Rivista di Medicina Aeronautica e Spaziale*, vol. 30, Apr.-Jun. 1967, p. 222-239. 15 refs. In Italian.

Maximal aerobic work was measured in kg./min. in a group of 49 athletes (sprinters and long-distance runners, throwers, oarsmen), formed, for about one half, of recordmen of the Greek National Teams of track and boat racing. Maximal aerobic work was calculated by performing two phases of sub-maximal exercise, in steady state, lasting six min. A bicycle ergometer was used. The oarsmen represent a group with a clear higher capacity to maximal aerobic work ( $1430 \pm 260$  kg./min.) followed by long-distance runners ( $1380 \pm 240$  kg./min.) and sprinters ( $1210 \pm 260$  kg./min.). Statistically, considerable difference was found between oarsmen and sprinters. The importance is stressed of determining maximal aerobic work in evaluating the physical condition of athletes. This is of peculiar interest for those sports that need considerable cardiopulmonary reserves to be used in strenuous work, in order to maintain circulatory, respiratory and metabolic steady states.

## A67-82280

**FIRST AID AND EVACUATION OF CARDIAC PATIENTS WITH EQUIPPED MOTOR-AMBULANCE AND HELICOPTER [IL SOCCORSO E IL TRASPORTO DEL CARDIOPATICO CON AUTOAMBULANZA ED ELICOTTERI APPPOSITAMENTE ATTREZZATI].**

T. Lomonaco and V. Puddu (Rome U., Italy).  
*Rivista di Medicina Aeronautica e Spaziale*, vol. 30, Apr.-Jun. 1967, p. 211-221. In Italian.

The writers discuss medical and social importance of first aid of cardiac patients, carried out with proper staff and facilities. A service for rapid evacuation of these patients to specialized hospitals has to be developed, and a survey is needed of indications and contra-indications of motor ambulance and medical helicopter. Possible staff and medical equipment of the vehicles used in evacuation of cardiac patients are described and discussed.

#### A67-82281

**INCREASING EFFECT OF LOWERED AIR PRESSURE ON MUSCULAR EXERTION RESULTING IN A DEPRESSION OF THE ASCORBIC ACID LEVEL OF THE ADRENAL GLANDS [POTENZIERENDER EFFEKT DES NIEDRIGEN LUFTDRUCKS AUF DIE DURCH MUSKELARBEIT HERVORGERUFENE SENKUNG DES ASCORBINSÄURESPIEGELS DER NEBENNIERE].**

B. Stojan and K. Tittel (Deut. Hochschule für Körperkult., Inst. for Sportmed., Leipzig, East Germany).  
*Schweizerische Zeitschrift für Sportmedizin*, vol. 14, no. 4, 1966, p. 366-369. In German.

The decrease of the ascorbic acid level in the adrenal glands of rats after muscular exertion and under lowered air pressure was examined. The effect was greater when both stresses were applied together.

#### A67-82282

**DO PULSE RATE RECOVERY TESTS HAVE SIGNIFICANCE FOR EVALUATION OF PERFORMANCE CAPACITY? [HABEN DIE PULSERHOLUNGSTESTS BEDEUTUNG BEI DER BEURTEILUNG DER LEISTUNGSFAHIGKEIT?].**

P. Van Uytvanck and J. Vrijens (Ghent U., Belgium).  
*Schweizerische Zeitschrift für Sportmedizin*, vol. 14, no. 4, 1966, p. 361-365. 11 refs. In German.

Experiments investigating the significance of recovery times of the pulse rate after exercise for the measurement of performance capacity were conducted using boys between 14 and 15 yrs. of age. Pulse rate recovery times were found to be unsuitable as an index. There was no significant correlation with physiological measurements (maximal O<sub>2</sub>-uptake and performance pulse add at 70 w/min.).

#### A67-82283

**THEORETICAL AND EXPERIMENTAL EFFECTS OF VARIATIONS IN RHYTHM OF MOVEMENT AT EQUAL STRENGTH [EFFETS THEORIQUES ET EXPERIMENTAUX DES VARIATIONS DE RYTHME DU GESTE, A PUISSANCE EGALE].**

J. J. S'Jongers, E. Robaye, M. Hebbelinck, and M. Segers (Brussels Free U., Lab. of Work and Lab. of Psychol., Belgium).  
*Schweizerische Zeitschrift für Sportmedizin*, vol. 14, no. 4, 1966, p. 348-360. 9 refs. In French.

The effect of rhythm changes on the physiological effect of movements with constant strength was studied. Theoretically physiological adaptation to performance should be influenced by such changes. The experiments confirmed this, but the theoretical considerations were only partially verified. There were rhythms where the same strength was needed but oxygen consumption was lower than predicted. The existence of preferred rhythms suggested that mechanical factors were not the only factors involved.

#### A67-82284

**ACCELERATION OF THE HEART RATE AT THE BEGINNING OF INTENSIVE SPORTS ACTIVITY [DIE BESCHLEUNIGUNG DES HERZSCHLAGES ZU BEGINN INTENSIVER SPORTLICHER BETÄTIGUNG].**

G. Israel and S. Israel (Deut. Hochschule für Körperkult., Inst. für Sportmed., Leipzig, East Germany).  
*Schweizerische Zeitschrift für Sportmedizin*, vol. 14, no. 4, 1966, p. 331-347. 31 refs. In German.

Sports activities were enumerated in the following order with regard to their chronotropic effect: running, skiing, swimming, rowing, and cycling. The differences were statistically significant. The reasons for this sequence were explained in detail. Quick movements caused stronger accelerations of the pulse rate than vigorous ones. Subjectively perceived exertions and heart rate accelerations did not show a parallel course in the various sports activities. The highest heart rate acceleration was obtained in the maximum up-hill run. Several activities simultaneously performed did not have an additive effect if the heart rate acceleration was already brought close to the limit by one of these activities. The basic value was highly significant for chronotropic reasons; the lower it was, the greater was the possible acceleration.

#### A67-82285

**BIRDS VERSUS AIRCRAFT.**

John Hillaby.  
*New Scientist*, vol. 36, Oct. 5, 1967, p. 18-20.

The threat of birds to aircraft, especially during take-off and landing, was discussed. The various species of birds and examples of aircraft damage are given. Efforts to reduce the problem and to eliminate or reduce the number of birds on airfields, etc. were presented. It was indicated that the problem is far from solved.

#### A67-82286

**RESPIRATORY CHANGE AND MENTAL TASK GRADIENT.**

John K. Adamowicz, David Gibson, and David Kaufman (Calgary U., Canada).  
*Psychonomic Science*, vol. 9, Oct. 5, 1967, p. 183-184. 13 refs.  
 Grant NRC, Canada APA-220.

The proposed connection between mental task difficulty levels and heart rate change was examined using a respiration measure and pretested intensities of mental task demand and white noise for 27 subjects. Similarity of direction and magnitude of results between studies based on cardiovascular measures and the present respiration findings indicate that conclusions can be generalized physiologically. Interpretations were offered with respect to the formulations of Lacey and of Malmö.

#### A67-82287

**BACKWARD MASKING AS A FUNCTION OF INTERSTIMULUS DISTANCE.**

R. Levine, R. Didner, and N. Tobenkin (N. Y. U., New York City).  
*Psychonomic Science*, vol. 9, Oct. 5, 1967, p. 185-186. 6 refs.

A study was performed to determine the effect of interstimulus distance on visual backward masking. Utilizing the Method of Limits, stimuli were presented by means of a three field tachistoscope. When interstimulus distances were small, masked elements were not perceived at all. As distances increased a gradient effect was observed.

#### A67-82288

**LEVELS OF ANXIETY, DOMINANT TENDENCY AND MIRROR-TRACING PERFORMANCE.**

**A67-82289**

Murray Meisels, Zakhour I. Youssef, and Michael J. Doran (Eastern Mich. U., Ypsilanti).  
*Psychonomic Science*, vol. 9, Oct. 5, 1967, p. 193-194.

Farber and Spence's demonstration that the drive theory of anxiety is useful in predicting motor performance was replicated, using a maze tracing task under simple and complex conditions. Results under the complex condition supported drive theory, while results under the simple condition were equivocal.

**A67-82289**  
**CRITERION SHIFTS AND THE DETERMINATION OF THE MEMORY OPERATING CHARACTERISTIC.**

K. L. Gibson (Stanford U., Palo Alto, Calif.).  
*Psychonomic Science*, vol. 9, Oct. 5, 1967, p. 207-208. 6 refs.

Seven university students ran seven sessions in a continuous recognition memory experiment. Responses were made on a six-point rating scale which was used to construct a memory operating characteristic (MOC). The subject's criteria were manipulated by varying the probability distribution of the outcomes, and the effects of the criterion shifts on the MOC were examined. The MOCs for the different conditions were found to be shifted but overlapping.

**A67-82290**  
**MEMORY LOSS WITH AGE: A TEST OF TWO STRATEGIES FOR ITS RETARDATION.**

Mary W. Laurence (Toronto U., Ontario, Canada).  
*Psychonomic Science*, vol. 9, Oct. 5, 1967, p. 209-210. 5 refs.

Two experiments were conducted to study the effectiveness of two different strategies in overcoming the short-term memory deficiencies typically observed in the elderly. Opportunity to rehearse material related to that which subsequently would appear in the test list proved of no benefit in augmenting recall. Significant higher recall was found however when elderly subjects had a cue available at the time of recall to aid retrieval of a particular time.

**A67-82291**  
**SET AND THE ENCODING OF VISUAL STIMULI.**

Eleanor Sexton and John P. McLaughlin (Delaware U., Newark).  
*Psychonomic Science*, vol. 9, Oct. 5, 1967, p. 219-220.

Encoding strategy and its consistency with method of report were varied to evaluate their interaction with the effect of set. Set instructions lowered errors for subjects encoding by separate stimulus dimensions, but not for subjects encoding by syntax. Syntax encoders made more errors for figures on the right than on the left. Set seems to affect the order in which information is encoded when the strategy permits such treatment.

**A67-82292**  
**THE EFFECT OF MOTIVATIONAL AROUSAL ON INFORMATION PROCESSING IN THE CONVERGENT WORD IDENTIFICATION TASK.**

Peter Suedfeld and Nancy Goeller (Rutgers-The State U., New Brunswick, N. J.).  
*Psychonomic Science*, vol. 9, Oct. 5, 1967, p. 231-232. 7 refs.  
Rutgers U. supported research.

Motivational arousal led to improved performance on simple problems without affecting performance on complex problems. It also resulted in increased utilization of clues. Its effects seem more specific than those of high input, and may be explicable in terms of arousal theory.

**A67-82293**  
**SENSORY DEPRIVATION AS A DRIVE OPERATION: EFFECTS UPON PROBLEM SOLVING.**

Peter Suedfeld (Rutgers-The State U., New Brunswick, N. J.), Sam Glucksberg, and Jack Vernon (Princeton U., N. J.).  
*Journal of Experimental Psychology*, vol. 75, Oct. 1967, p. 166-169. 12 refs.

Grants PHS MH-10742-01 and NSF G-21762.

Sensory deprivation and financial incentive had parallel effects upon problem-solving performance, supporting the view that sensory deprivation is a drive-arousing operation. Problem-solving performance varied nonmonotonically with overall drive level, consistent with the Yerkes-Dodson inverted-U hypothesis.

**A67-82294**  
**ACCURACY OF JUDGMENTS OF MOVEMENT IN DEPTH FROM TWO-DIMENSIONAL PROJECTIONS.**

Patrick L. Ross (Johns Hopkins U., Baltimore, Md.).  
*Journal of Experimental Psychology*, vol. 75, Oct. 1967, p. 217-225.

Grant NIMH R01MH11062.

Moving two-dimensional projections were seen by subjects who were required to judge the shape of the three-dimensional path in which the stimuli supposedly producing the projections were moving. The subjects were able to discriminate between different elliptical three-dimensional paths for all stimulus sets, but the judged path was also a function of the number and arrangement of the elements in a set. Increasing the number of elements and their symmetry led to more stable percepts, but not necessarily to more accurate ones.

**A67-82295**  
**BELIEF STATES AND SEQUENTIAL EVIDENCE.**

Thornton B. Roby (Tufts U., Medford, Mass.).  
*Journal of Experimental Psychology*, vol. 75, Oct. 1967, p. 236-245. 15 refs.  
Contracts NONR 494(15), AF 19(628)2450, and Grant NSF G-10947.

Reactions of naive subjects to sequences of probabilistic evidence were compared with a Bayes model. Comparisons concerned both modal tendencies and the reliability of idiosyncratic reactions. Batches of 22 and 19 undergraduates were exposed to sequences permitting tests of six theoretical epistemic indexes. General tendencies were: (a) validities approaching intersequence reliability; (b) a bias toward moderate certainty; (c) monotonic convergence to the final estimate; (d) saltatory rather than continuous adjustments; (e) disproportionate weighting of early evidence; (f) a slight bias in reaction to single clues. Individual scores on indexes were generally reliable across sequences.

**A67-82296**  
**QUANTUM REQUIREMENT FOR PHOTOSYNTHESIS IN CHLOROPHYLL-DEFICIENT PLANTS WITH UNUSUAL LAMELLAR STRUCTURES.**

Georg H. Schmid and Hans Gaffron (Fla. State U., Inst. of Mol. Biophys., Dept. of Biol. Sci., Tallahassee).  
*Journal of General Physiology*, vol. 50, Oct. 1967, p. 2131-2144. 38 refs.  
Contract AEC AT-(40-1)-2687.

Neither an over-all deficiency of chlorophyll, nor an increased enzymatic capacity for maximal rates, nor an unusual lamellar structure was found to change the number of quanta required for the evolution of one molecule of oxygen in healthy aurea mutants of tobacco. The average minimal quantum number remains 10

(efficiency 0.1) as in many algae and typical higher plants. Most of the time the optimal efficiency depends on the availability of some far-red radiation, particularly in the blue region of the spectrum where blue light alone is rather inefficient. These results fit an explanation offered earlier in connection with the hydrogen or acetate photometabolism of algae in far-red light.

#### A67-82297

##### IMMEDIATE RECALL OF SPOKEN DIGITS PRESENTED THREE AT A TIME.

M. C. Corballis (Auckland U., New Zealand).

*Canadian Journal of Psychology*, vol. 21, Oct. 1967, p. 416-424. 6 refs.

Contract Nonr-4896(00) and Grant DRB, Canada 9425-10.

Spoken digits were presented via three "channels", created by presenting the digits through earphones three at a time, one to each ear and a third to both ears at once. If subjects received two such triplets in succession at a slow presentation rate (one triplet every two sec.), they usually attempted to report the digits in the first triplet followed by those in the second, a "temporal" mode of report. But when presentation was fast (one triplet every sec.), the incidence of temporal report decreased and over-all accuracy of recall declined. "Channel by channel" report, though often attempted when presentation was fast, was not an efficient recall strategy.

#### A67-82298

##### AVOIDANCE CONDITIONING WITH CENTRAL AND PERIPHERAL AVERSIVE STIMULATION.

Verne C. Cox (Fels Res. Inst., Yellow Springs, Ohio).

*Canadian Journal of Psychology*, vol. 21, Oct. 1967, p. 425-435. 25 refs.

NASA Grant NsG-437, Grants NIH M-4529 and NIH MH-25, 749.

Shuttle-box avoidance conditioning with aversive midbrain stimulation, in the rat, was considerably inferior to that observed with aversive foot shock. However, rats were capable of efficient passive avoidance when exposed to aversive midbrain stimulation. Extensive training, amphetamine, and pretraining with aversive foot shock failed to facilitate shuttle-box avoidance learning with midbrain stimulation.

#### A67-82299

##### THE INFLUENCE OF CONTEXTUAL CUES UPON THE LEARNING AND RETENTION OF PAIRED ASSOCIATES.

George Swede and John A. McNulty (Dalhousie U., Halifax, Canada).

*Canadian Journal of Psychology*, vol. 21, Oct. 1967, p. 394-408. 12 refs.

Grants NRC APT-86 and NRC APB-86.

A list of nonsense-syllable paired associates was given to subjects to learn under four different conditions—(1) color context, (2) shape context, (3) color plus shape context, and (4) no context. A test of retention was administered 24 hr. later, with subjects relearning the list under the same or changed context conditions (relative to the context present during original learning). Results of the experiment indicated that item-specific contextual cues surrounding the stimulus items enhanced learning of the paired associates. When various context conditions were presented in the test of retention 24 hr. later, recall of the response times was greatest when the retention context contained the same item-specific cues as the original learning context. Removing contextual cues which had been present during learning caused a decrement in

recall. Adding or changing contextual cues had no effect upon recall, as long as the particular context present during learning was also present during the retention test. The ease with which the paired associates were relearned was influenced by the relearning context, but was relatively independent of the context conditions under which original learning took place. These results were interpreted as supporting a modified stimulus selection hypothesis.

#### A67-82300

##### OBSERVATIONS RELATING TO THE POSSIBLE ROLE OF CALCITONIN IN CALCIUM HOMEOSTASIS IN MAN.

M. M. O'Brien and Hamish W. McIntosh (Brit. Columbia U., Dept. of Med. and Shaughnessy Hosp., Clin. Invest. Unit, Vancouver, Canada).

*Canadian Medical Association Journal*, vol. 97, Oct. 14, 1967, p. 941-943. 11 refs.

Intravenous calcium infusions were carried out in normal subjects, treated hypothyroid patients, osteoporotic patients, and idiopathic calcium stone formers. The results in terms of serum calcium levels after the infusion demonstrated an altered response in the hypothyroid group consistent with failure of calcitonin production. The response in the stone formers was identical to that in the normals. The osteoporotics showed a different pattern of response, but it was not suggestive of diminished calcitonin production.

#### A67-82301

##### ALTERATION OF THE PRIMARY RESPONSE OF THE SOMATOSENSORY AREA ON EXPOSURE TO CHOLINEPOTENTIATING SUBSTANCES [IZMENENIE PERVICHNOGO OTVETA SOMATO-SENSORNOI ZONY KORY PRI VOZ-EISTVII KHOLINOPOTENTSIRUIUSHCHIKH SREDSTV].

V. B. Prozorovskii (State U., Petrozavodsk and Med. Inst., Central Sci.-Res. Lab. of Pediat., Leningrad, USSR).

*Fiziologicheskii Zhurnal SSSR*, vol. 53, no. 8, 1967, p. 899-905. 15 refs. In Russian.

The application of eserine, proserine, nivaline and armine solutions to the cerebral cortex of cats resulted in an increase of the amplitude of the primary response evoked by stimulating the radial nerve. This increase was prevented and eliminated by N-cholinethics. M-cholinethic atropine evoked an increase of response amplitude. It is supposed that the effect of cholinepotentiating substances is due to the preferential sensibility of the facilitating N-cholinereactive neurones.

#### A67-82302

##### MICROELECTRODE INVESTIGATION OF THE EXTINCTION OF RESPONSES OF NEURONS IN THE VISUAL CORTEX OF WAKEFUL RABBIT EXPOSED TO SOUND STIMULATION [MIKROELEKTRODNOE ISSLEDOVANIE UGASHENIA REAKTSII NEIRONOV ERITEL'NOI KORY VODRSTVUIUSH-CHEGO KROLIKA NA DEISTVIE ZVUKOVOGO STIMULA].

V. G. Skrebetskii and L. I. Ganich (USSR, Acad. of Med. Sci., Brain Inst., Lab. of Electrophysiol., Moscow).

*Fiziologicheskii Zhurnal SSSR*, vol. 53, no. 8, 1967, p. 906-914. 15 refs. In Russian.

From a total of 86 studied neurons in the visual cortex of awake rabbits exposed to a sound stimulation an increase of neuron activity rate was observed in three and inhibition of this activity in 83 neurons. This extinction of inhibitory responses was carried out in 48 cells of the latter neurons. This extinction was manifested by weakening of the inhibitory response up to its complete cessation in multiple sound presentations. The repetition of stimulus also led to weakening of the response of the neurons activated by sound. No marked correlation between the changes

of the inhibitory response and the electroencephalogram (EEG) arousal response was found while there was a clear correlation between the response of neurons activated by sound and the EEG arousal response. The unidirectional character of the changes of neuron activity in the visual cortex under the influence of sound and during a motor response evidences a modal nonspecific nature of these changes. The studied response is the neuroncorrelate of the orientation reflex.

**A67-82303**

**MEASUREMENT OF VISUAL FATIGUE BY CHANGES IN ACCOMMODATION AND CONVERGENCE [MERENI ZRAKOVE UNAVY ZMENAMI AKOMODACE A KONVERGENCE].**

J. Krivohlavý.

*Československá Psychologie*, vol. 11, no. 4, 1967, p. 347-352. 8 refs. In Czech.

The article presents a survey of methods to measure visual fatigue and proposes a technique of complex visual performance. This involves a serial reading of stimuli in punctum proximum and punctum adlatum. The stimuli are near the threshold values. They are formed by rings similar to Landolt's rings interrupted not on 8 but on 12 different places. These stimuli are arranged in squares on panels. The subject reads always five times 16 rings. The time necessary for reading and number of errors are ascertained. The performance is expressed in the multitude of information transferred in time. Visual fatigue appears in the decreased performance while doing this kind of reading by means of accommodation and convergence movements simultaneously with the differentiation of the stimuli in their recording.

**A67-82305**

**THE EFFECT OF ALPHA- AND BETA-ADRENORECEPTOR BLOCKING AGENTS ON POST-EXERCISE HYPERAEMIA IN MAN.**

J. D. Fewings (Adelaide U., Dept. of Human Physiol. and Pharmacol., South Australia).

*Australian Journal of Experimental Biology and Medical Science*, vol. 45, Aug. 1967, p. 347-354. 8 refs.

Natl. Health and Med. Res. Council, Australia supported research.

The effect of intra-arterial infusion of the  $\beta$ -adrenoreceptor blocking agent propranolol and the  $\alpha$ -adrenoreceptor blocking agent phenoxybenzamine on post-exercise hyperemia was examined in the human forearm. The post-exercise hyperemia was significantly reduced by propranolol, but not affected by phenoxybenzamine. The reduction of the post-exercise hyperemia by propranolol appeared to be due to its  $\beta$ -adrenoreceptor blocking action on adrenaline, released as a result of the emotional stress involved in performing the exercise.

**A67-82306**

**THE PECULIARITIES OF THERMOREGULATION AND OTHER RESPONSES UNDER CONDITIONS OF THE NORTH IN MAN [OB OSOBNOSTIAKH TERMOREGULIATSII I DRUGIKH REAKTSIIAKH U CHELOVEKA V USLOVIYAKH SEVERA].**

L. F. Tuliakova and G. A. Antropov (F. F. Erisman Sci.-Res. Inst. of Hyg., Moscow, USSR).

*Fiziologicheskii Zhurnal SSSR*, vol. 53, no. 8, 1967, p. 969-973. 8 refs. In Russian.

The typical levels of body temperature, the temperature of the various parts of the skin, the level of heat loss, pulse rate and the latent periods of sensorimotor responses evoked by heat, sound and light stimulation were established for human subjects

acclimatized to the conditions of the North. Season and age differences of these values are given for the range of heat comfort and for the range of various temperatures.

**A67-82307**

**NATURE OF THE EVOKED BIOELECTRICAL RESPONSES OF THE ASSOCIATIVE CORTEX IN THEIR RECORDING FROM VARIOUS CORTICAL LAYERS [KHARAKTER VYZVANNYKH BIOELEKTRICHESKIKH REAKTSII ASSOTSIATIVNOI KORY PRI IKH POSLOINOI REGISTRATSII].**

R. A. Durinian and A. G. Poliakova (USSR Acad. of Med. Sci., Inst. of Normal and Pathol. Physiol., Lab. of Physiol. of Afferent Systems, Moscow).

*Fiziologicheskii Zhurnal SSSR*, vol. 53, no. 8, 1967, p. 865-873. 18 refs. In Russian.

Acute experiments performed on cats showed that the potentials evoked by the stimulation of the sciatic nerve are monophasic negative oscillations while those evoked by the stimulation of the brachial nerve are biphasic responses with an enlarged negative wave. In respect to their latencies these responses are similar to the primary responses of projective areas. On this ground they were designated by us as early associative responses (EAR). In immersing electrodes into the various layers of the rostral part of the associative region patterned changes of EAR latencies and amplitudes were observed. However, no response inversion was found. It is supposed that the structure of the associative region is somewhat different from that of projective areas. The presence of the uninverted positive and negative components of EAR substantiates the view that in the formation of these responses both depolarization postsynaptic potentials and hyperpolarization postsynaptic activity take part.

**A67-82308**

**THE VISUAL PROCESSES UNDERLYING BINOCULAR BRIGHTNESS SUMMATION.**

G. R. Engel (Defence Res. Med. Labs., Downsview, Ontario, Canada).

*Vision Research*, vol. 7, Sep. 1967, p. 753-767. 7 refs.

Magnitude estimates of the brightness of targets presented monocularly were combined to predict the binocular brightness resulting from the fusion of monocular targets of various luminances. It was found that binocular brightness was a function of the vector sum of the monocular brightness responses and the spatial cross-correlation of the two monocular test fields taken as wholes. Certain non-linear summation effects, e.g. Fechner's Paradox, found by previous investigators, were controlled in this investigation. An underlying mechanism explaining the non-linearities was proposed.

**A67-82309**

**VISUAL ACUITY IN MONKEYS: A MONOCULAR AND BINOCULAR SUBJECTIVE TECHNIQUE.**

Donald N. Farrer (6571st Aeromed. Res. Lab., Holloman AFB, N. Mex.).

*Vision Research*, vol. 7, Sep. 1967, p. 743-747. 11 refs.

A technique for obtaining monocular and binocular visual acuity measurements from rhesus monkeys was described. This procedure involved a backlit screen and projection mechanism which presented stimuli varying in size between 0.5 and 10.0 minutes of arc. The subject was rewarded by pressing one of four levers based on a discrimination between four Landolt rings. Subjective visual acuity data were presented for one subject.

**A67-82310**

**ANCHOR EFFECT LIMITS.**

Robert Adamson.

*Psychonomic Science*, vol. 9, Oct. 5, 1967, p. 179-180. 5 refs. Grant AFOSR 1163-66.

In a category rating study, anchors of .01 sec., .04 sec. and 1.0 sec. were compared as to their effects on judgments of duration for series stimuli of 2, 4, 6, 8, and 10 sec. The rationale was to try to find a breakpoint in terms of anchor effects, i.e., an extreme stimulus value which did not affect series judgments. Since the .01 sec. anchor had no effect in lowering adaptation level, whereas both of the other anchors did (1 sec. group,  $p = .05$ ; .05 sec. group,  $p = .03$ ), the assumption of a breakpoint was supported.

#### A67-82311

##### HEART RATE RESPONSE TO NON-SIGNAL TONES.

William G. Chase and Frances K. Graham (Wisc. U., Madison). *Psychonomic Science*, vol. 9, Oct. 5, 1967, p. 181-182. Grants NIH HD01490, NIH K3-MH-21762, and NSF FR000249.

The heart rate response to onset of 18-sec. nonsignal tones heard over 71 db. white noise was solely decelerative and habituated rapidly; the response to tone offset was similar to the onset response. It was suggested that cardiac deceleration is a component of the orienting reflex.

#### A67-82312

##### PROBLEMS OF SPACE GENETICS [PROBLEMY KOSMICHESKOI GENETIKI].

N. P. Dubinin (USSR, Acad. of Sci., Inst. of General Genet., Moscow).

*Izvestiia Akademii Nauk SSSR. Seriya Biologicheskaya*, no. 5, 1967, p. 669-680. 59 refs. In Russian.

There are four major genetic problems associated with space environment. They are: (1) factors causing mutations under space flight conditions and the nature of mutations developing in this unusual environment; (2) selection of new forms of organisms for the closed ecological system of the spacecraft; (3) evaluation of the effect of various space flight factors on the heredity of different organisms and development of protective measures to ensure reliable performance of the ecological system components; and (4) study of molecular, cytologic and genetic aspects of the heredity of extraterrestrial life forms. Space genetics is a new branch of science, and the Institute of General Genetics has organized a large laboratory for the study of the mutagenic effects of space flight, protection against their influence and selection of plants necessary for the ecological system of the spacecraft. Biological exploration of outer space is being extended, and long duration space flights through radiation belts are planned. The Moon will become the place of continuous research and the launch ground for space vehicles.

#### A67-82313

##### MODERN STATE AND PROSPECTS FOR THE SOLUTION OF THE PROBLEM OF THE ORIGIN OF LIFE [SOVREMENNOE SOSTOYANIE I PERSPEKTIVY RESHENIIA PROBLEMY VOZNIKNOVENIIA ZHIZNI].

A. I. Oparin (USSR, A. N. Bakh Inst. of Biochem., Moscow). *Izvestiia Akademii Nauk SSSR. Seriya Biologicheskaya*, no. 5, 1967, p. 656-668. 55 refs.

The appearance of life on the Earth was a law-governed process which included the synthesis of carbon compounds and, consequently, the function of multi-molecular systems. Today objective methods of scientific research into this process have been developed which involve both observation of similar phenomena in the surrounding world and performance of laboratory experiments modeling events of the remote past. Results obtained from extensive studies have disclosed in principle the course of evolution of matter that resulted in the appearance of life.

#### A67-82314

##### TOUCH DISPLAYS: A PROGRAMMED MAN-MACHINE INTERFACE.

E. A. Johnson (Roy. Radar Estab., Malvern, Great Britain).

*Ergonomics*, vol. 10, Mar. 1967, p. 271-277.

A number of models of the Touch Display have been built for evaluation and, as a result of experiments comparing their use with more conventional keyboards it has been shown clearly that the use of the Touch Display provides both a faster and more accurate means of communicating between an operator and a data-processing system. One of the significant advantages is that only the computer program affects the interpretation and labelling of the "keys", and consequently equipment provision and installation can proceed without hazard, even though final decisions on the "labels", etc., have not been taken. The Touch Display will be used in the Air Traffic Control Data-processing Systems in the United Kingdom and it is firmly believed that it will find wider application in other systems.

#### A67-82315

##### THE DEPENDENCE OF THE ADAPTATION LEVEL ON ANCHORING STIMULI [DIE ABHANGIGKEIT DES ADAPTATIONSNIVEAUS VON ANKERREIZEN].

Viktor Sarris (Hamburg U., Psychol. Inst., West Germany).

*Zeitschrift für Experimentelle und angewandte Psychologie*, vol. 14, 1st Quarter, 1967, p. 1-53. 49 refs. In German.

A critical experiment was designed to clarify a question concerning Helson's Adaptation-Level (AL) theory which had not been investigated previously. In the main experiment 160 subjects were asked to judge the weight of five objects with differing weight under ten conditions involving different anchoring stimuli; in the supplementary experiment 40 subjects were asked to judge five different weights under four different measurement interval conditions, whereby the mean geometric measurement was held constant. In both cases a randomized groups design was employed. The statistical analysis of the empirically determined AL values in the present study led to a falsification of Helson's formula, both with respect to the anchor AL and with respect to the relationship between the measurement interval and AL. In contrast to Helson's prediction formula, the empirical relationship between anchor and AL was not monotonic for weight; and, furthermore, the variation of the measurement interval had no influence upon the AL. However, a revised formula proposed here led to empirically satisfactory and theoretically meaningful results. Future experiments on AL theory and the revised formula offered here should be broader in scope, and the validity and areas of application of Helson's theory should be investigated anew.

#### A67-82316

##### A KINESTHETIC SPATIAL AFTERAFFECT WITH PRONATION OF THE FOREARM.

J. K. Collins, (Sydney U., Australia).

*Australian Journal of Psychology*, vol. 19, no. 2, 1967, p. 117-120. 9 refs.

Studies of the kinesthetic aftereffect have involved judgments of shape, tilt, width and limb position. The relationship between tilt aftereffects and aftereffects of limb position are demonstrated in this investigation. A kinesthetic aftereffect similar in nature to the tilt aftereffect but without movement during stimulation is described. Details of the conditions of stimulation, the size of the effect and the technique of measurement are given. A number of advantages in the use of this technique are suggested.

#### A67-82317

##### TRANSFER OF SPATIAL CHROMATICITY-CONTRAST AT THRESHOLD IN THE HUMAN EYE.

## A67-82318

Gerard J. C. van der Horst, Charles M. M. de Weert, and Maarten A. Bouman (State U., Dept. of Med. and Physiol. Phys., Phys. Lab., Utrecht, The Netherlands).  
*Journal of the Optical Society of America*, vol. 57, Oct. 1967, p. 1260-1266. 36 refs.  
Netherlands Organ. for Advan. of Pure Res. (Z.W.O.) supported research.

Color discrimination data were compared with the predictions of a generalized fluctuation theory for visual threshold behavior. Observations for the tritanopic component of vision at low luminances were in good agreement with the expectations from this theory. Just-noticeable differences of hue were measured with equiluminous square-wave test objects, which were modulated only in chromaticity. A chromaticity-contrast sensitivity function was introduced for the description of these results, in analogy of the luminance-contrast sensitivity function. Observations were made for different spatial frequencies at four reference wavelengths and at several luminance levels. The results did not show an attenuation of the low frequencies such as appeared in the luminance-threshold contrast modulation. From this it was inferred that spatial interactions were different in the chromaticness and brightness channels of the visual system. Furthermore a decrease of the luminance level caused an increase of the neural integrative interaction of the color signals. The measured chromaticity-contrast sensitivity function was divided into an optical and a nervous component. A calculation for the optical part was given.

## A67-82318 EFFECT OF ARTERIAL OXYGEN ON MAMMALIAN BRAIN OXYGEN TENSION.

Carl R. Merrill (Natl. Inst. of Mental Health, Bethesda, Md.) C. Charlton (Natl. Inst. of Dental Res., Bethesda, Md.), P. Yarnell, and A. K. Ommaya (Natl. Inst. of Neurol. Diseases and Blindness, Bethesda, Md.).  
*Nature*, vol. 216, Oct. 21, 1967, p. 295-297. 14 refs.

Intermittent polarographic membrane electrodes were used for  $O_2$  determinations in the cerebral cortex of four healthy rhesus monkeys anesthetized with Nembutal. The oxygen tension ( $p_{O_2}$ ) was measured in room air and in a high  $O_2$  atmosphere. The  $p_{O_2}$  range measured in each brain was large; however, the  $p_{O_2}$  was relatively constant in any particular area of the brain during the steady state. There was a significant decrease in brain  $p_{O_2}$  when the monkeys were exposed to 100%  $O_2$ . These results were compared with those found in rats and in men in other studies. Whether the decrease of cortical time  $p_{O_2}$  in monkeys was caused by a regional vasoconstriction on some other mechanism was not ascertained.

## A67-82319 PROBABILITY PROCESSES IN THE TACTILE MOTOR SYSTEM [ZUFALLSPROZESSE IN DER HAPTOMOTORIK].

Dieter Betz (Cologne U., West Germany).  
*Zeitschrift für Experimentelle und angewandte Psychologie*, vol. 14, 1st Quarter, 1967, p. 54-70. 5 refs. In German.

Fifteen subjects were presented with a tactile stimulus in the form of a point on a table top to which the experimenter guided them by moving their hand so that the point of a pencil which they were holding came to rest at the stimulus. The subjects were then asked to make 20 tactile reproductions of the stimulus successively by pointing with their pencil while wearing darkened glasses. For each subject, the experiment was carried out first with one hand and then the other. The results of these reproduction trials suggested the following conclusions: (1) the most important factor in determining the deviations from the original stimulus appeared to be chance; (2) the correctness of the assumption that

the deviations which occurred with successive reproductions of the point were due to an anisotropy of the tactile space was shown to be even less probable (the present experimental results would seem to eliminate the anisotropy hypothesis as an explanation for the deviations); and (3) when the number of trials was increased the subjects appeared to manifest what may be a "control parameter" which has not thus far been clearly studied.

## A67-82320 ACCOMMODATIVE CONVERGENCE: AN ADAPTIVE NONLINEAR CONTROL SYSTEM.

Jerald Brodkey and Lawrence Stark (Presbyterian-St. Luke's Hosp., Dept. of Biomed. Eng., Chicago, Ill.).  
*Presbyterian-St. Luke's Hospital Medical Bulletin*, vol. 6, Apr. 1967, p. 30-43. 18 refs.

Accommodative convergence of the eyes relates to reflex convergence when the lens accommodates for distance. The system has been studied in both frequency and time domains by providing sinusoidal and pulse stimuli of target distance from the eye and measuring the degree of convergence as output. Both predictable single sinusoidal and unpredictable multiple sinusoidal data are obtained and related to subject experience in tracking. The results for single sinusoidal input at varying input amplitudes show the system to behave as if it contained a no-memory nonlinearity. Open loop single sinusoidal data was measured directly and compared with open loop Bode plots theoretically derived from the closed loop data. Instability oscillations are demonstrated and their frequency is predicted by the open loop data. A mathematical model to describe the data is derived. The adaptive nature of the system is discussed and evidence is given for a prediction operator as an input adaptive feature. The instability oscillations are shown to occur in those situations in which one might predict small signals to be produced by an initial error sensing element in the system. It is suggested that one type of adaptive function is to vary the gain of the controller or error correcting portion of the system and hence the total open loop gain. When situations then arise that markedly increase open loop gain, instability oscillations result. Finally, the system is shown to behave as if it were not a sampled data system, but rather operates on data flow continuously.

## A67-82321 ORIGIN OF ROUND-BODY STRUCTURES IN THE ORGUEIL METEORITE.

S. L. VanLandingham (Northeast La. State Coll., Dept. of Biol., Monroe), C. N. Sun (St. Louis U., School of Med., Dept. of Pathol., Mo.), and W. C. Tan (Ind. U., School of Med., Dept. of Biochem., Indianapolis).  
*Nature*, vol. 216, Oct. 21, 1967, p. 252-253. 5 refs.

The problem of contamination was investigated by ultra-thin sectioning of mineral pieces of the Orgueil meteorite. Electron micrographs revealed numerous round objects which were electron opaque. The size, shape, electron density, interior matrix continuity, well-defined surface contour, and thickness of the surface wall suggested some degree of organization of the bodies. It was suggested that the bodies are most probably indigenous to the meteorite rather than a contamination, but it was not concluded they are strictly biological bodies.

## A67-82322 MECHANISM FOR THE EXCHANGE OF THE CALCIUM IN BONE MINERAL.

J. Samachson (Veterans Admin. Hosp., Metab. Sect., Hines, Ill. and Ill. U., Coll. of Med., Chicago).  
*Nature*, vol. 216, Oct. 14, 1967, p. 193-194. 10 refs.  
PHS supported research.

Reaction mechanisms for the exchange of the calcium in bone mineral were reported. The sequence of events proposed was supported by indirect evidence obtained with zinc-65 and calcium-47.

#### A67-82323

##### ACCEPTABILITY OF FOOD ITEMS DEVELOPED FOR SPACE FLIGHT FEEDING.

Robert A. Nanz and Paul A. Lachance (NASA, Manned Spacecraft Center, Biomed. Res. Office, Houston, Tex.).

*Food Technology*, vol. 21, Oct. 1967, p. 71-72, 74-77. 23 refs.

The acceptability of food items developed for space flight feeding was investigated. A cross-sectional group of rehydratable foods was discussed, and the organoleptic ratings which these reconstituted items received under both laboratory and simulator study conditions were reviewed. Groups of foods investigated included cereal, fruit, vegetable and meat products and various kinds of soup. These items seemed to be suitable for missions of extended duration.

#### A67-82324

##### MOTOR SKILLS, HANDEDNESS AND BEHAVIOUR.

K. A. Provins (Adelaide U., Australia).

(*Inter-relation of Biol. and Cult. Adaptation, Symp., Austria, Jul. 1966*).

*Australian Journal of Psychology*, vol. 19, no. 2, 1967, p. 137-150. 71 refs.

The main approaches to the assessment and investigation of motor performance are briefly reviewed and the current explanation of the nature of human skills in terms of engineering concepts is discussed. In relation to motor skills in particular, an attempt is made to discuss the findings of experimental and other studies in terms of the underlying organization of muscle activity. It is proposed that a key feature of motor skills is the consistency of the movement pattern and the implication of this is discussed for an explanation of the development of handedness.

#### A67-82325

##### DARK ADAPTATION AND SPONTANEOUS DISCHARGE IN THE RETINA [ADATTAMENTO ALL'OSCURITA E SCARICA SPONTANEA NELLA RETINA].

Luigi Cervetto and G. Moruzzi.

*Atti della Accademia Nazionale dei Lincei*, vol. 42, Jan. 1967, p. 102-104. 16 refs. In Italian.

Spontaneous activity of single ganglion cells in the cat's retina was analyzed after different levels of illumination. It was found that the settling time of the transient period is a characteristic of the single unit, independent of the previous illumination. It was of about two to three min. Relations between the level of illumination preceding dark adaptation and the course of the discharge transient were presented.

#### A67-82326

##### ON PSYCHO-PHYSICAL OR PSYCHO-SOCIAL FACTORS AS ELIMINATING REASONS DURING THE PERIOD OF PROFESSIONAL TRAINING FOR AN AIR FORCES APPLICANT PILOT. GENERAL CONSIDERATIONS [FACTEURS PSYCHO-PHYSIQUES ET PSYCHO-SOCIAUX COMME CAUSES D'EVICION AU COURS DE LA FORMATION PROFESSIONNELLE DE L'ELEVE PILOTE DE L'AERONAUTIQUE MILITAIRE. CONSIDERATIONS GENERALES].

Mario Strollo.

(*Office Intern. de Doc. de Méd. Mil., 27th Session, San Marino, Sep. 1966*).

*Revue Internationale des Services de Santé des Armées de Terre de Mer et de l'Air*, vol. 40, Jun. 1967, p. 515-519. In French.

The training period for a military pilot is of some months duration and is based on flying activity. In any country the air forces can fail a large number of applicants for various reasons. These include use of bad judgment, and commonly deal with a generic evaluation of professional inaptitude or physical unfitness for flight duty. It is suggested that a thorough psycho-physical and psycho-social examination be given to the candidate. Better knowledge of the candidate would place those that otherwise would be eliminated. It is suggested that the physician should have more psychological training and experience and should work in closer conjunction with the flight instructor to evaluate the candidate.

#### A67-82327

##### NITROGEN RETENTION IN ADULT MAN: A POSSIBLE FACTOR IN PROTEIN REQUIREMENTS.

Hans Fisher, M. K. Brush, P. Griminger, and E. R. Sostman (Rutgers-The State U., Dept. of Nutr., New Brunswick, N. J.).

*American Journal of Clinical Nutrition*, vol. 20, Sep. 1967, p. 927-934. 20 refs.

Grant PHS AMO-4904.

Experiments were undertaken to investigate the effects of high nitrogen (N) intakes from good quality protein on N retention and on body composition. Diets supplying from 9 to 34 g.N/day were given to 20- to 22-yr.-old male college students. On dietary-N intakes in excess of 15 g./day, considerable quantities of N were retained over periods of several weeks. The total quantity of N retained could not be accounted for in terms of observed body-weight changes, or body-composition measurements based on whole-body <sup>40</sup>K concentrations. Thus, a major portion of the stored N appears to be retained as nonprotein N. The amount of N retained on the high-protein intakes was particularly intriguing in view of the relatively high-protein intake of these subjects prior to their participation in the present diet studies. The full significance of such N stores awaits further investigation.

#### A67-82328

##### SAMPLING OR INTERMITTENCY IN THE HAND CONTROL SYSTEM.

Fernando Navas and Lawrence Stark (Presbyterian-St. Luke's Hosp., Dept. of Biomed. Eng., Chicago, Ill.).

*Presbyterian-St. Luke's Hospital Medical Bulletin*, vol. 6, Apr. 1967, p. 52-77. 22 refs.

A hand control model is proposed. Investigation of the hand's intermittency synchronization shows it corresponds to an input-synchronized sampler rather than the clock-synchronized sampler more typical of engineering systems. The velocity control mechanism, similar to that in an eye tracking system is shown to be absent in the hand. A quantitative transfer function for predictable inputs serves further to define the hand's input adaptive characteristics. Stability margin adjustments of a linear reduced model enabled us to match the available quantitative data. The most exciting result of this study is the evidence for intermittency: a refractory period shown in the short pulse experiment, peaks in the frequency response experiments, and a saccadic sequence of steps in response to an open loop step input.

#### A67-82329

##### DYNAMICS OF THE SACCADIC EYE-MOVEMENT MECHANISM.

Gerald Cook and Lawrence Stark (Presbyterian-St. Luke's Hosp., Dept. of Biomed. Eng., Chicago, Ill.)

*Presbyterian-St. Luke's Hospital Medical Bulletin*, vol. 6, Apr. 1967, p. 44-51. 17 refs.

Contracts Nonr-609(39), Nonr-1841(70), AF-33(616)-7282, AF-33(616)-7588, AF 49(638)-1313, DA-18-108-405-Cml-942, Grants NIH NB-3055, NIH NB-3090, NIH MH-06175, NIH 7-R01-MH-11907-01 PMY, NIH 1-R01-NB-06197-01, NIH 1-R01-NB-06487-01, and PHS FR-05477; W. Clement and Jessie V. Stone Found. and Smith Kline and French Found. supported research.

An on-line computer was used to experimentally measure the dynamic performance of horizontal eye movement saccades. A mathematical model based upon physiological measurements in the literature was assembled for the plant—eyeball and eye muscles, and the controller signals—EMG. Simulation of the model with parameter adjustment led to reasonably close agreement between model and experimental overall behavior. It was found that actual movements require about three times as long for completion as would be necessary if the system operated with a minimum time policy.

#### A67-82330

##### IMMUNOLOGICAL CHANGES IN ANIMALS EXPOSED TO LOW SULPHUR DIOXIDE CONCENTRATIONS.

I. Ardelean, M. Cucu, Elena Andronache, and Selma Bodurian (Med. Pharm. Inst., Dept. of General and Communal Hyg. and Inst. of Hyg., Sect. of Communal Hyg., Bucharest, Rumania).

*Rumanian Medical Review*, no. 1, Jan.-Mar. 1967, p. 12-15.

The action of polluting products in the atmosphere on infectious processes and immunity was investigated using rabbits for the determination of the action of low sulfur dioxide (SO<sub>2</sub>) concentrations on the formation of agglutinins and alexin titers. Results indicated the following conclusion: (1) low SO<sub>2</sub> concentrations inhibited the formation of agglutinins, altered the alexin titer, had a local irritative effect and exercised a general action on the mechanisms of immunogenesis; and (2) SO<sub>2</sub> action in immunity processes took place in stages beginning with a transitory stimulation stage and continuing with inhibition of the immunological processes that become more accentuated as the intoxication progresses.

#### A67-82331

##### LARGE FLUCTUATION OF SKIN TEMPERATURE AT CONSTANT AMBIENT TEMPERATURE IN HUMANS, RABBITS, GOAT AND FOWLS.

Keizo Honma, Katsuya Kimura, Etsumori Harada, Kazuo Sekine, and Hidenori Sato (Hokkaido U., Fac. of Vet. Med., Dept. of Physiol., Sapporo, Japan).

*Japanese Journal of Veterinary Science*, vol. 29, Apr. 1967, p. 79-87. 27 refs. In Japanese.

In humans, rabbits, goats and fowls skin temperatures were measured in various areas of the body at ambient temperatures falling from 40° to 5°C. and some random constant ambient temperatures between 0 and 40°C. Skin temperatures fluctuated with a large amplitude of over 0.2°C. without any special causes, the largest amplitude being about 20°C. in fowl. The patterns of temperature change at various skin spots were classified tentatively into the following four types. Type 1: Large fluctuation of skin temperature was exhibited in the middle range of ambient temperature. An S-shaped curve was shown when the maximum skin temperatures at each ambient temperature had been plotted. Type 2: Small fluctuation of skin temperature was exhibited in the middle and the higher ranges of ambient temperature. Skin temperature was always a little higher than ambient temperature. Type 3: Large fluctuation of skin temperature was seen in a

relatively low range of ambient temperature. A bow-shaped curve was shown only when the maximal values of skin temperature at each ambient temperature had been plotted and connected. Type 4: Small fluctuation of skin temperature was exhibited in almost all ranges of ambient temperature. A bow-shaped curve was shown. The human toe temperature was only one measurement that was classified into two types. Of the cases of this temperature, many belonged to Type 1 and some to Type 2. It took a long time, sometimes three or four hr., for the temperatures at such skin spots as those of the human toe and rabbit hind leg to reach a final stable value in response to a given ambient temperature. The largest amplitude of fluctuation in body temperature at a given constant ambient temperature was about 11°C. in humans, about 14°C. in rabbits, about 19.6°C. in goat, and about 20°C. in fowls. The rise in skin temperature and the large fluctuation in skin temperature observed in Type 1 seemed to appear simultaneously in the same range of ambient temperature. Each species of animals, including humans, had its own range of ambient temperature in which skin temperature Type 1 rose considerably and showed large fluctuations. Such range was approximately from 20 to 25°C. in humans, 16 to 23°C. in rabbits, 15 to 25°C. in goats, and 15 to 23°C. in fowls.

#### A67-82332

##### THE ACTION SPECTRUM FOR BLUE-LIGHT-STIMULATED OXYGEN UPTAKE IN CHLORELLA.

J. M. Pickett and C. S. French (Carnegie Inst. of Wash., Dept. of Plant Biol., Stanford, Calif.)

*Proceedings of the National Academy of Sciences*, vol. 57, Jun. 1967, p. 1587-1593. 12 refs.

The action spectrum for the stimulation of oxygen uptake by blue light was determined for *Chlorella pyrenoidosa*. The action spectrum was limited to wavelengths shorter than 550 mμ and had peaks at 460 and 375 mμ. The peaks were separated by a definite minimum at 400 mμ. The action spectrum indicated that the responsible pigment is a flavin. The effect was not closely coupled to system two of photosynthesis because the uptake was not inhibited by 10<sup>-5</sup> MDCMU.

#### A67-82333

##### NIGHT MYOPIA AT NIGHT AUTOMOBILE DRIVING LUMINANCES.

Oscar W. Richards (Am. Opt. Co., Res. Center, Southbridge, Mass.) (*Am. Acad. of Optometry, Ann. Meeting, Denver, Colo., Dec. 10, 1966*).

*American Journal of Optometry and Archives of American Academy of Optometry*, vol. 44, Aug. 1967, p. 517-523. 17 refs.

The acuity and contrast vision of two populations of 74 and 241 people, ages 16-90, were measured at 10, 1, 0.1, and 0.01 fL. Tests for night myopia were made at the lower luminances with added spherical power lenses of +0.75 D to -1.50 D. Four individuals saw better with a plus correction at 0.1 fL, but only one at 0.01 fL (night presbyopia?). The vision of 20 and 10% of the people was improved with power corrections from -0.25 D to -1.50 D and the amounts, frequencies and age relations were reported. Insofar as these small populations are representative, some 10 to 15% of people could benefit by a special night driving glass based on a refraction made with a 0.1 to 0.3 fL chart brightness approximating night driving luminances. No arbitrary minus add can be used for all people without handicapping the vision of most people. The large individual variations found probably resulted from the dioptries of each eye and the focusing ability of the accommodative mechanism.

**A67-82334****THE EFFECT OF AGE AND FOOD DEPRIVATION UPON THE GENERAL ACTIVITY OF THE RAT.**

Milton H. Hodge, L. J. Peacock, and Louis A. Hoff (Ga. U., Dept. of Psychol., Athens).

*Journal of Genetic Psychology*, vol. 111, first half, Sep. 1967, p. 135-145. 9 refs.

Grant NICHD HD 00946 and Ga. U. supported research.

Four groups of rats, 30, 40, 60, and 365 days of age, were given a ten-day adaptation period and then deprived of food for 48 hr. Food was then restored and activity was recorded continuously until the mean activity of each group had returned to the predeprivational level. The results confirmed the findings of previous investigations that brief food privation produces larger activity increases in younger rats than in older rats. Autocorrelational analyses showed a 1.5- to two-hr. activity cycle in all but the 365-day-old rats during adaptation and deprivation. During the recovery period, only the 60-day-old rats showed a periodicity greater than one hr. Finger's satiation syndrome was observed in the older rats but not in the younger ones.

**A67-82335****DAILY RHYTHMIC CHANGES IN TYROSINE TRANSAMINASE ACTIVITY OF THE RAT LIVER.**

Richard J. Wurtman and Julius Axelrod (Mass. Inst. of Technol., Dept. of Nutr. and Food Sci., Cambridge and Natl. Inst. of Mental Health, Lab. of Clin. Sci., Bethesda, Md.)

*Proceedings of the National Academy of Sciences*, vol. 57, Jun. 1967, p. 1594-1598. 13 refs.

The activity of tyrosine transaminase in the rat liver was investigated using animals subjected to hypophysectomy, adrenalectomy or no operation. The activity of tyrosine transaminase in the rat liver varied markedly during each 24-hr. period. Soon after the onset of darkness, enzyme activity was four times greater than it was during the early part of the light period. The rhythm persisted following hypophysectomy or bilateral adrenalectomy, but appeared to be entrained by the adrenocortical secretory cycle in the intact animal. Lighting conditions and the time of day at which the animals were killed seemed to be important for data interpretation.

**A67-82336****ELECTRICAL STIMULATION OF OCULOMOTOR NUCLEUS: THE EFFECTS OF STIMULUS VOLTAGE AND ANESTHESIA.**

Donald G. Pitts (USAF School of Aerospace Med., Aerospace Med. Div., Ophthalmol. Branch, Brooks AFB, Tex.)

*(Am. Acad. of Optometry, Ann. Meeting, Denver, Colo., Dec. 10, 1966).*

*American Journal of Optometry and Archives of American Academy of Optometry*, vol. 44, Aug. 1967, p. 505-516. 21 refs.

Instrumentation and procedures for the study of the central control of accommodation were presented. Positive accommodation, an increase in the dioptric power of the eye, and negative accommodation, a decrease in the dioptric power of the eye, were found by brainstem stimulation. The threshold for positive and negative accommodation was about seven volts. The effect of different anesthetics and drugs on accommodation was stressed. Flaxedil and neosynephrine did not alter the response. Ether-light nembutal and ether-Flaxedil preparations showed no demonstrable differences. It was concluded that with proper care all data could be compared in the analysis of the central control of accommodation.

**A67-82337****MAGNETIC FIELD EFFECTS ON THE COMPASS MECHANISM AND ACTIVITY LEVEL OF THE SNAIL HELISOMA DURYI ENDISCUS.**

Nancy D. Gottlieb and Willard E. Caldwell (George Washington U., Dept. of Psychol., Washington, D. C.)

*Journal of Genetic Psychology*, vol. 111, first half, Sep. 1967, p. 85-102. 8 refs.

The behavioral effects of weak magnetic fields, time of day, and time of month were investigated; and subjects were ten snails (*Helisoma duryi endiscus*) which were run approximately 115 trials under each field condition, resulting in a total of 462 trials under the four conditions. Three times a day for three weeks subjects were individually run in a 1.5 gauss magnetic field of three different orientations, with the geomagnetic field as the control field condition. Directional behavior and activity level were considered to be indicants of experimental effects. The "whole-compass" technique was introduced as an improvement in assessment of directional behavior. Statistically significant data reveal that activity level is differentially affected by the magnetic field conditions, by time of month, and by the interactions between field condition, time of month, and time of day. Significant differences in directional behavior were found for one time-of-day and one time-of-month condition. It is apparent, however, that directional-behavior effects are quite subtle and less demonstrable than are activity-level effects.

**A67-82338****UROPEPSIN PRODUCTION AT HIGH ALTITUDE DURING PHYSICAL LABOR [DIE UROPEPSIN-AUSSCHIEDUNG IN GROSSEN HOHEN BEI KÖRPERLICHER ANSTRENGUNG].**

H. Eigelsreiter (Innsbruck U., Inst. für Physiol., Austria).

*Internationale Zeitschrift für angewandte Physiologie*, vol. 24, no. 2, 1967, p. 111-120. 30 refs. In German.

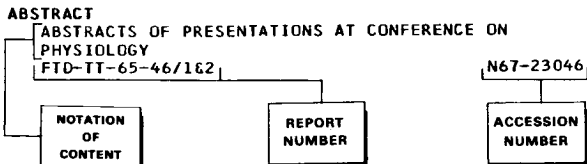
Uropepsin secretion (UP-A) in healthy, young men was hardly affected by a single stay at altitude (2,800 m.). Strenuous physical exercise at altitude (ascent to 4,600 m. under exhausting conditions) caused a similar elevation of UP-A as during prolonged sports activity at lower altitude. During the summit ascent, a somewhat lower average increase of UP-A was obtained in experimental subjects given 75 mg. dipyrindamole (Persantin) than in those who received a placebo. This indicated a greater tolerance of oxygen deficiency during physical exercise at high altitudes under the influence of dipyrindamole.

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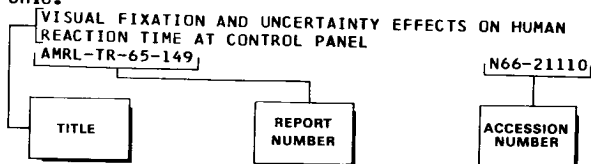
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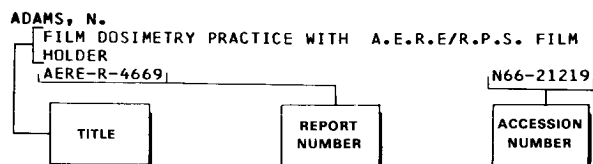
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